



## DEVELOPMENT, VALIDATION, AND IMPLEMENTATION OF A MAINSTREAMING PROCESS TO TRANSITION STUDENTS FROM SELF-CONTAINED SPECIAL EDUCATION INTO GENERAL EDUCATION PLACEMENTS

**Michael Ryan Hunsaker<sup>i</sup>**

Ph.D, Department of Special Education,  
University of Utah, USA

### **Abstract:**

We developed a set of computational tools specifically to guide qualified special education students back into general education. These tools include a decision tree to identify candidate students and elucidate successful placement in general education. Candidate students enter a process involving selection of general education classroom, data collection, and finally how to make the final transition out of special education self-contained placements. In the 2015-2016, we undertook a limited implementation of these transenvironmental programming tools and facilitated the transition of 10 of 20 identified candidate students from self-contained academic special education classrooms into general education placements. In the 2016-2017 school year, we extended this process to include 4 schools. 16 of 53 identified candidate students from self-contained academic special education classrooms were able to transition into general education placements. In an extension of the model district-wide, 9 of 26 identified students from behavior/SEL unit classrooms, and 9 of 9 identified students from Life Skills/SID unit classrooms were successfully transitioned into a general education with part-time special education placement. A high percentage of the remaining candidates received >50% of their day in general education classrooms and/or were placed in less restrictive self-contained classrooms. Overall, 54% of identified candidate students were able to access a less restrictive environment as defined by IDEIA. Further, computational analyses using regression tree, unbiased hierarchal clustering, and support vector machine methods are presented to demonstrate the robustness of these methods by recapitulating the results using solely data from special education evaluations.

**Keywords:** transenvironmental programming, psychoeducational evaluation, MTSS, inclusion, mainstreaming, machine learning

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<sup>i</sup> Correspondence: email [michael.hunsaker@utah.edu](mailto:michael.hunsaker@utah.edu)

## 1. Introduction

It is critical that evidence based transenvironmental programming methods be developed to facilitate the transition of students from self-contained special education classrooms into less restrictive environments present in the cascading services model of special education services. The cascading services model works thus: The most restrictive educational environments are homebound or hospital-based education, followed by inpatient residential schools, then specialized schools, followed by self-contained specialized classrooms, self-contained resource, general education with part-time special education/Resource services, general education with itinerant or consultation services, and with general education without special education services being the least restrictive classroom environment.

Within the United States, the relevant education law is the 2004 re-authorization of the Individuals with Disabilities Education Improvement Act (IDEIA; *20 USC §1400 et seq Part D, Subpart 3, Sec 682*). In part, IDEIA states (emphasis added):

(c) Findings. –Congress finds the following:

1. Disability is a natural part of the human experience and in no way diminishes the right of individuals to participate in or contribute to society. Improving educational results for children with disabilities is an essential element of our national policy of ensuring equality of opportunity, full participation, independent living, and economic self-sufficiency for individuals with disabilities.
2. Before the date of enactment of the Education for All Handicapped Children Act of 1975 (Public Law 94-142), the educational needs of millions of children with disabilities were not being fully met because—
  - the children did not receive appropriate educational services;
  - the children were excluded entirely from the public school system and from being educated with their peers;
  - undiagnosed disabilities prevented the children from having a successful educational experience; or
  - a lack of adequate resources within the public school system forced families to find services outside the public school system.
3. Since the enactment and implementation of the Education for All Handicapped Children Act of 1975, this title has been successful in ensuring children with disabilities and the families of such children access to a free appropriate public education and in improving educational results for children with disabilities.
4. However, the *implementation of this title has been impeded by low expectations, and an insufficient focus on applying replicable research on proven methods of teaching and learning for children with disabilities.*
5. Almost 30 years of research and experience has demonstrated that the education of children with disabilities can be made more effective by—

- *having high expectations for such children and ensuring their access to the general education curriculum in the regular classroom, to the maximum extent possible, in order to–*
  - *meet developmental goals and, to the maximum extent possible, the challenging expectations that have been established for all children; and*
  - *be prepared to lead productive and independent adult lives, to the maximum extent possible;*

Special education to general education setting transition pipelines are critical because it is far too often the case that students, once placed in special education, remain in their initial special education placements long after they no longer require those highly specialized and individualized special education services to achieve academic progress (Anderson-Inman, 1987; Conway & Gow, 1988; Fuchs, Fuchs, & Fernstrom, 1992; Johnson, 2005; Klotz & Nealis, 2005). Difficulties in moving students back into the general education curriculum has led to suggestions that the cascading or tiered system of special education should be eliminated and replaced with scaffolds in the general education classroom to specifically support students identified with disabilities that impact their educational performance (*cf.*, conservationist vs. abolitionist argument in 1980s and 1990s; Anderson-Inman, 1987; Conway and Gow, 1988; Fuchs, Fernstrom, Scott, Fuchs, and Vandermeer, 1994b; Zigmond and Baker, 1995).

Lack of mobility toward less restrictive placements within the cascading model of special education is especially problematical for students that were initially placed in special education for behavioral, rather than academic, interventions at a very young age (*e.g.*, Pre-Kindergarten students with autism placed in self-contained classrooms for maladaptive behaviors). The lack of a clear transition process to exit students from full time special education/special-class settings can be detrimental to educational outcomes (Savich, 2008). This is due to the fact that students in special education miss out on access to instructional materials used in the general education classroom and core instruction from highly-qualified grade level teachers (Brownell, Sindelar, Kiely, & Danielson, 2010; Fuchs et al., 1992; Gersten & Dimino, 2006; Zigmond & Baker, 1995).

It has been suggested that special class placements are at best a separate but unequal entity in comparison with mainstream general education classrooms (Bedinim, 1990; Skiba et al., 2008; but *cf.*, counterexamples in Kauffman, Bantz, and McCullough, 2002; McLeskey, Landers, Williamson, and Hoppey, 2012). These arguments have led to discussions regarding IDEIA and the (un)intentional segregation of disabled and non-disabled students within the US public school system (Ferri & Connor, 2005; Marchese, 2000; McCarthy, Wiener, & Soodak, 2012; Nolan, 2004). This opinion was also alluded to in recent US Supreme Court opinions (*Endrew F. v. Douglas County School Dist. RE-1*, 580 U.S., 2017). What this means is that, at least in the academic literature, the impetus to design methods to integrate disabled students into the general education classroom was greater during the 1980s in the early days after the authorization of

IDEA than since the 2004 reauthorization of IDEIA (*cf.*, Peabody Re-Integration Project; Daniel, 1997; Fuchs et al., 1994b; Fuchs, Fuchs, and Fernstrom, 1993).

To address these challenges, we propose a decision making a flowchart called a *Academic Mainstreaming Decision Tree* to guide student profiling efforts and a specific *Mainstreaming Process* as specialized tools to guide transenvironmental programming with the aim of transitioning students out of self-contained special education classrooms and into the general education classroom. This flowchart was developed by taking data from the special education evaluation and performing recursive partitioning and hierarchal clustering and integrating the resulting maps into an easy to use decision tree.

The *Academic Mainstreaming Decision Tree* is a useful tool for self- contained special education classroom teachers to identify candidate students that will benefit from a less restrictive classroom environment. The *Mainstreaming Process* formally assists teachers of identified students to transition them into those less restrictive placements. What makes these processes unique is that, unlike the earlier work on transenvironmental programming that focused primarily on transitioning students from the part time special education / Resource classroom into the general education classroom, the present pipelines were designed to transition students in special classroom placements into the general education environment, both with and without the assistance of part time special education/Resource services.

The manuscript details the development of these data focused tools and implementation of the *Academic Mainstreaming Decision Tree* and *Mainstreaming Process* to guide students out of self-contained special education and into less restrictive educational placements.

## 2. Materials & Methods

### 2.1 Development of a Mainstream Decision Tree

The primary motivation for the development of an *Academic Mainstreaming Decision Tree* is the idea that access to the general education curriculum is legal right of every student, regardless classification and placement in special education (Conway & Gow, 1988; Hocutt, 1996; Johnson, 2005).

Although this need is universally accepted, it is often a difficult proposition to transition students out of self-contained special education classrooms and into general education classrooms full time. This can be for reasons of teacher or parent bias regarding student ability or coping skills (Marden, 2013; Praisner, 2003; Skiba et al., 2008; R. M. Smith, 2006) or the difficulties in specifically developing a process by which to undertake this type of a difficult transition (Cauley & Jovanovich, 2006; Fuchs et al., 1994b; Kalaci, 2007).

To directly address these challenges, we developed a process whereby the basic decision making steps for student transition are undertaken in an exclusively data-

driven manner. This method is loosely based on the response to intervention / multi-tier system of supports (RTI/MTSS) processes if observed from the point of view of moving down, rather than up, the tiers. This approach supplants the current system that requires teachers to use their best judgment in selecting candidate students for mainstreaming (Fuchs et al., 1994a; Fuchs et al., 1994b; Fuchs et al., 1993; Marden, 2013; Mathes, Fuchs, Roberts, & Fuchs, 1998; Wadsworth & Knight, 1999).

The Academic Mainstreaming Decision Tree was designed to focus only on data and thus prevent individuals from being asked or required to make judgment calls that may be informed by personal prejudices or biases regarding student potential for behavior and/or academic achievement (Raines, Dever, Kamphaus, & Roach, 2012; Reynolds & Shaywitz, 2009). Such data-driven decisions are important because any placements not explicitly motivated and supported by up-to-date evaluative data are legally indefensible, particularly if one applies the need for school districts to provide an appropriately ambitious educational benefit from special education, rather than the just more than de minimus standard as previously acceptable under legal statutes (*cf.*, *Endrew F. v. Douglas County School Dist. RE-1*, 580 U.S., 2017).

To reduce the occurrence of indefensible special education decisions, the Academic Mainstreaming Decision Tree depends on data collected during initial and subsequent special education evaluations. This means that the data used for the decision making process are readily available for virtually all students and relatively standardized, at least within individual school districts or Local Education Agency (LEAs). Importantly, these data were collected by multiple members of the IEP team and by related service providers, so there was never a single person in charge of both collecting the data and making decisions on those results.

### **2.1.1 Manual Selection of Mainstreaming LRE**

Using raw data from the student's most recent educational evaluation (raw values rather than categorical values), student allocation was determined for each student manually and annotated in a spreadsheet with the rest of the data from the above step using a combination of district rubrics for qualifying students as having Specific Learning Disabilities. These data were later used to evaluate the efficacy of the numerical analyses.

Data were collected from all students in academic self-contained classroom settings. All data were extracted from the student's most recent special education evaluation or re-evaluation. The following data were extracted: Adaptive Function (General Adaptive Composite-GAC), Full Scale IQ (FSIQ), SocioEmotional data (Anxiety, Behavioral Symptoms Index-BSI, Conduct Disorder), WJ-III NU data for academics (Basic Reading Skills, Reading Comprehension, Math Reasoning, Math Calculation, Written Language) and Curriculum Based Measures (Math and ELA/Reading). See Table 1 for specific items extracted from special education files. Table 2 details data explicitly *excluded* from any computational analyses *a priori*.

These values were converted into categorical variables based on the school district rubric for classification as specific learning disability (SLD; *cf.*, Appendix B). The categorical variables are presented in Table 3.

### **2.1.2 Regression Tree Development**

To determine the relative importance of different measures from the special education file, recursive partitioning was performed. These methods split the data into 2 groups initially based on the type of data that creates the most statistically reliable split among groups. This process is repeated across all resulting groups until the algorithm can find no reliable way to split the groups further. The result of this analysis is a regression tree that looks like a flowchart or decision tree. In this way, the most influential factor is on top of the resulting tree and factors are considered increasingly less influential the lower they are on the tree (*i.e.*, more influential or important factors are at the top and factors contribute less to the overall tree the further down they are located).

This analysis was performed with the *rpart* library in the R statistical computing package (R Development Core Team, 2017; Therneau, Atkinson, et al., 2017). This analysis was performed 3 times, first with the academic data included (mean scores across WJ-III NU as well as mean scores across CBM), once with academic information withheld, and once with the CBM and WJ-III NU measures separated. The second condition that left out all academic data was considered critical as often times the files for incoming students in K-2nd grades with classifications of DD, AU, SLI, or OHI most often lack academic testing or else previous teams have deemed those results unreliable. Once the *rpart* code was executed, the resulting tree-based visualizations were saved to file and remained unaltered. A deliberate choice was made to not cut the trees using a *prune* command or post process them in any way for the sake of transparency.

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**Table 1: Data Considered by a Mainstream Decision Tree**

Adaptive	Intelligence	Academic Achievement		Emotional
GAC	FSIQ / PRI	Woodcock	Johnson III-NU/IV	BSI/Anxiety
VABS 2/3 ABAS 2/3 BASC 2/3 (Adaptive) ECI DABS DP-3	Stanford Binet V Weschler Nonverbal (WNV) WISC III/IV/V Woodcock Johnson III-NU/IV KBIT 2 Leiter R UNIT 2 DAS Batelle CAS K-ABC Raven's Matrices	Reading Skills Reading Comprehension Math Calculation Math Reasoning Broad Writing (includes Spelling) Broad Reading Broad Math	Curriculum Based Measurements District Benchmarks Utah Compose AIMS Web DRA 2 Spelling City GoMath Benchmark Tests Eureka Math DIBELS Next Success Maker Imagine Learning Reflex Math Common Formative Assessments (CFA)	BASC 2/3 Connor's 3 Achenbach CBCL SPENCE SCARED RCADS CARS YAM-5 ASC-ASD MASC-2
			xAny evidence-based measure approved by IEP team	

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**Table 2: Data Not Considered by a Mainstream Decision Tree**

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Desire to keep student in class as a "good example" Behavioral data from the self-contained classroom Past lack of success in mainstreaming  
 Past lack of school skills necessary for mainstreaming Anecdotal reports of any kind not supported by data  
 Requirement for para-educator time or increased classroom resources Student idiosyncrasies/peculiarities  
 Student personality  
 Parent concerns about academic abilities Parent concerns about behavioral abilities Social skills deficits  
 Student mobility issues  
   Requirement for Orientation & Mobility Services Use of assistive technology  
 Special education classification Information regarding disability severity  
 Status as a non-native English speaker/Need for ELL services Student speech issues  
   Selective Mutism Aphasia

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Apraxia Stuttering Prosody Errors  
 Medical/Psychiatric diagnoses Autism  
 ADHD  
 Epilepsy  
 Tic Disorders Tourette's  
 ODD, OCD, Bipolar, BPD, etc. Anxiety/Depression status  
 Sensory Impairments  
 Visual Impairment/Blindness Deaf-blindness  
 Hearing Impairment/Deafness  
 Sensory Processing Disorder/Need for a Sensory Diet  
 Current or past medications  
 Medication compliance or noncompliance  
 Hesitation of parents to pursue psychiatric help for student Quality of Relationship Teacher has with Parent  
 "Red Flag" or helicopter parent

**Table 3:** Continuous to Categorical Value Mapping for use in computational analyses

<b>Measure</b>	<b>Value Definitions</b>	<b>Value Range</b>
Adaptive	SS 0-59 = 0, SS >60 = 1	[0, 1]
FSIQ	SS 0-70 = 0, SS 70-100 = 1, SS >100 = 2	[0, 1, 2]
SocioEmotional	T 0-70 = 0, T >70 = 1	[0, 1]
WJ-III NU	SS 0-70 & RPI 0-18 = 0, SS 70-100 & RPI 18-34 = 1, SS >100 = 2	[0, 1, 2, 3]
CBM	<25%ile = 0, >25%ile = 1	[0, 1]



The R code for the recursive partitioning was:

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```
library(rpart)

library(rpart.plot)

# For the condition of no academic information included in the analysis

fit <- rpart( Outcome ~ Adaptive + FSIQ + SocioEmotional , data = na.omit
  (merged_data), method = "class", parms = list(prior = c(.3, .3, .4)
  ), cost = c(3, 1, 1), control = rpart.control(minsplit=1, minbucket
  = 1, cp = -1))

rpart.plot(fit, type = 0, extra = 100, box.palette = "auto", branch.lty
  = 1, shadow.col = "gray", nn = TRUE, under = TRUE, tweak = .75, main = "
  Decision Tree ( Academic Testing Absent )")

# For the condition of academic information present and collapsed into WJ-III and CBM means

fit <- rpart( Outcome ~ Adaptive + FSIQ + WJIII + CBM + SocioEmotional ,
  data = na.omit(merged_data), method = "class", parms = list(prior = c(.3, .3, .4
  )), cost = c(3, 1, 2, 2, 1), control = rpart.control(
  minsplit = 1, minbucket = 1, cp = -1, mincriterion = .5))

  rpart.plot(fit, type = 0, extra = 100, box.palette = "auto", branch.lty
  = 1, shadow.col = "gray", nn = TRUE, under = TRUE, tweak = .75,
  main = " Decision Tree ( Academic Testing Present )")

# For the condition of academic information present and included as each subtest's
means

fit <- rpart( Outcome ~ Adaptive + FSIQ + CBM Math + CBM Reading + Basic
  _Reading Skills + Reading Comp + Math Reasoning + Math Calc + Written Lang +
  SocioEmotional , data = na.omit(merged_data), cost = c
  (3, 1, 2, 2, 2, 2, 2, 2, 1), parms = list(prior = c(.4, .6)), method = "class", control
  = rpart.control(minsplit = 1, minbucket = 1, cp = -1))

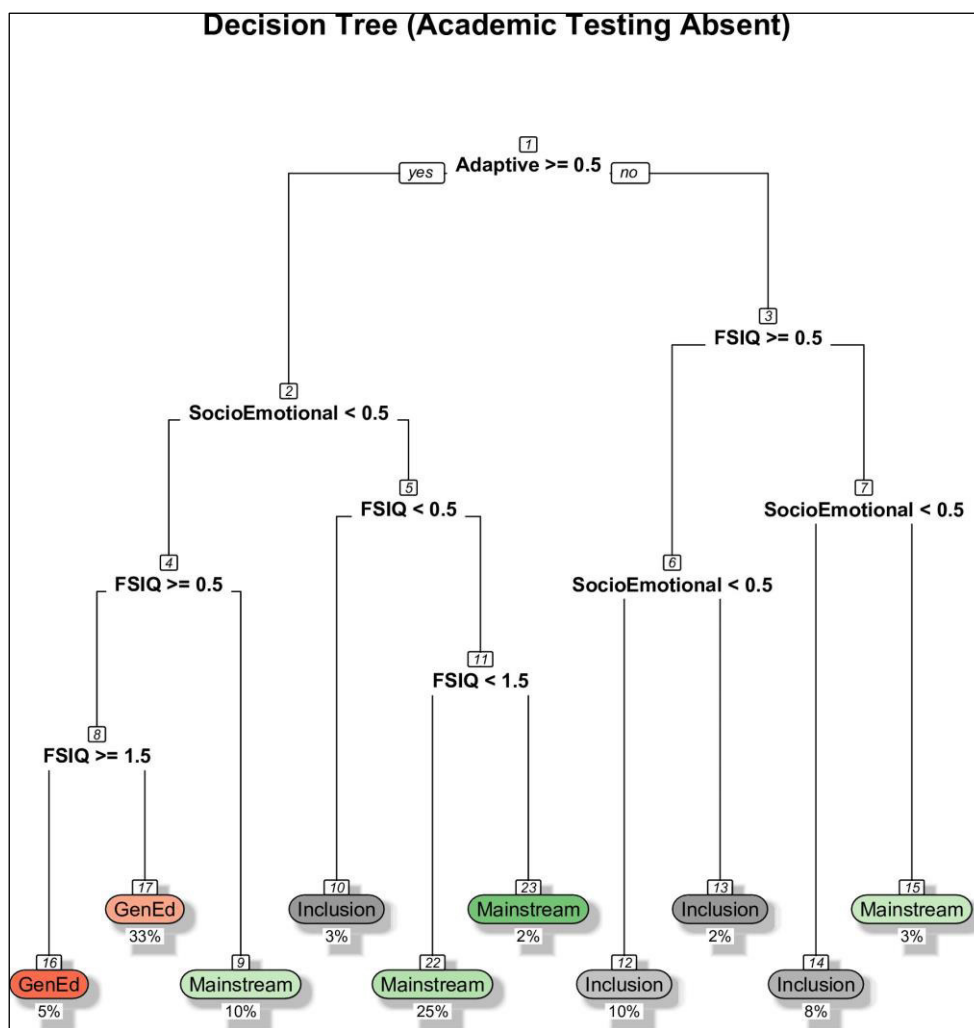
rpart.plot(fit, type = 0, extra = 100, branch.lty = 1, shadow.col = "gray", nn =
  TRUE, under = TRUE, tweak = .75, main = " Decision Tree (
  Academic Testing Separated )")
```

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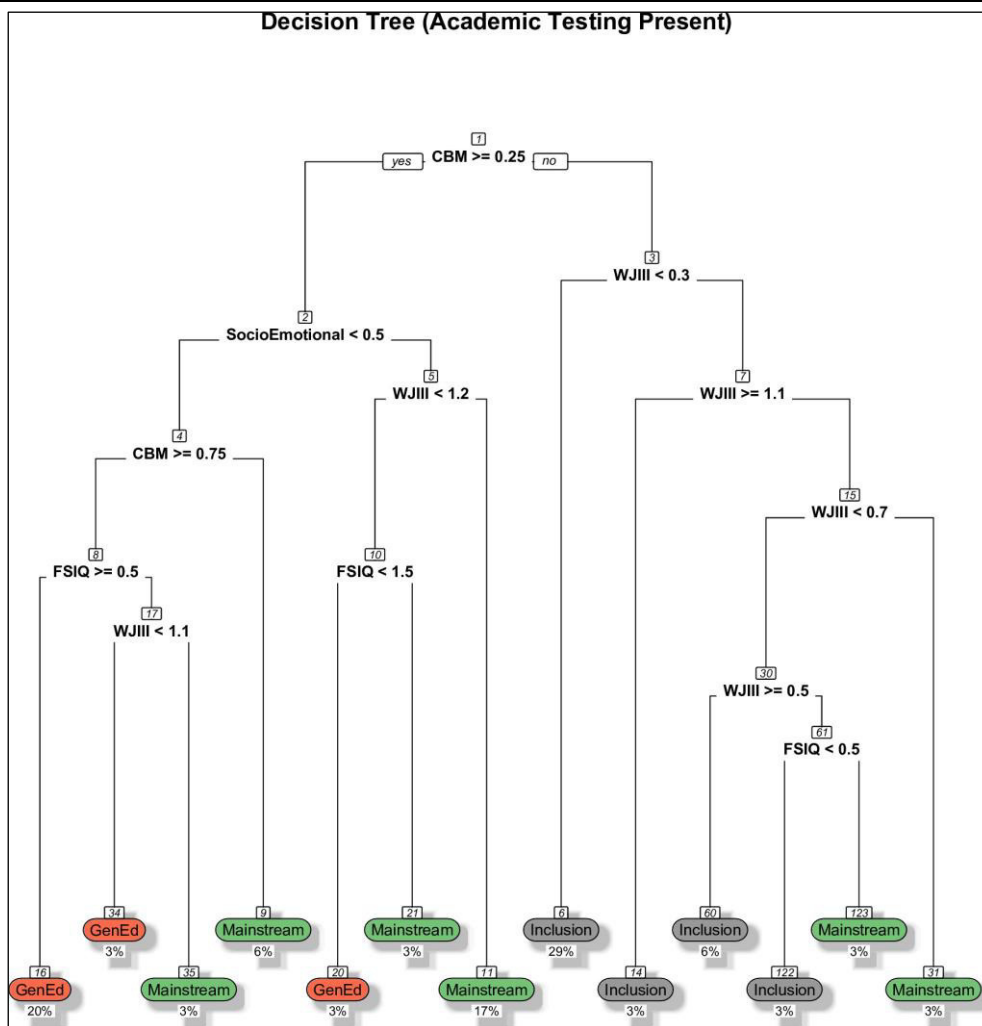
### 2.1.3 Regression Tree Interpretation

As can be seen from the partition tree in Figure 1, when academic testing is not available, the *rpart* algorithm used Adaptive Function as the first split point, supporting previous research that suggests academic and social success depends heavily on adaptive function. SocioEmotional data then seems to be the next most important data for determining student placement, followed by FSIQ data (Figure 1).

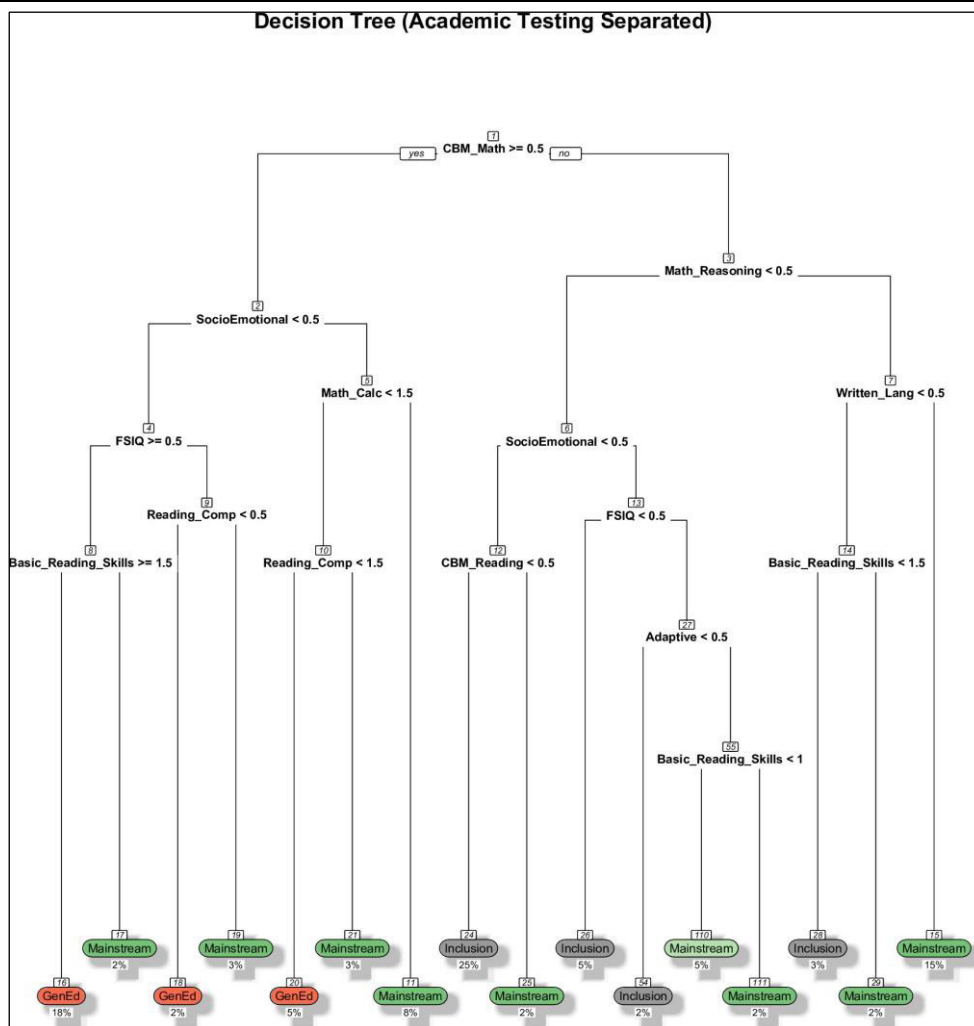
When academic information is included as means for ELA/Reading and Math across the WJ-III NU and CBM, CBM (indicating classroom performance) is the primary determining factor for success, followed by WJ-III NU and SocioEmotional function. FSIQ appears to only become involved when very low WJ-III NU scores are present and there are some SocioEmotional challenges reflected in high values (Figure 2). A further recursive analysis was undertaken wherein all CBM and WJ-III NU data were included as individual items and not averaged together. The resulting regression tree suggested CBM performance in math, followed by reading comprehension and math reasoning were the most critical academic factors, with Basic Reading Skills, CBM Reading, Math Calculation, and Written Language scores showing less influence (Figure 3).



**Figure 1:** Results of a Regression Tree Analysis without Academic Data. The results demonstrate that adaptive function is the most influential data in student placement, followed by SocioEmotional and Full Scale IQ. Interestingly, for students with Adaptive scores >60, SocioEmotional data have a higher influence than IQ scores. The opposite is true for low adaptive scores.



**Figure 2:** Results of a Regression tree analysis with academic data. When academic data are included in the regression tree, it is clear that curriculum based measures are the best predictor of student success. This is intuitive since the best measure of success is success itself, which is what CBM measure. For high CBM values, SocioEmotional function is the next important feature, followed by academics and FSIQ. For low CBM, it appears that the important factors are academic performance on the WJ-III NU followed by FSIQ measures.



**Figure 3:** Results of a Regression tree analysis with academic data separated. When academic data are included in the regression tree, it is clear that curriculum based measures are the best predictor of student success. This is intuitive since the best measure of success is success itself, which is what CBM measure. CBM performance in math, followed by Reading Comprehension and Math Reasoning were the most critical academic factors, with Basic Reading Skills, CBM Reading, Math Calculation, and Written Language scores showing less influence.

### 2.2 Hierarchy of Measures Included in Mainstream Decision Tree

For ease of interpretation and allow for a computational implementation of a regression tree a decision making rubric, the results seen in Figure 1, Figure 2, and Figure 3 were synthesized into a single document. Judgments were made regarding the hierarchy of measures included in the *Academic Mainstreaming Decision Tree* based on clinical and school psychology research. There was a conscious effort undertaken to emphasize nonacademic factors as it was hypothesized that many students may perform poorly on academic testing due to previous lack of exposure to the curriculum or testing methods. The resulting *Academic Mainstreaming Decision Tree* is shown in in Figure 4 and Appendix C.

The hierarchy followed by the *Academic Mainstreaming Decision Tree* is Adaptive Function as the first decision point, followed by Full Scale IQ, Academic Achievement, and finally SocioEmotional Well Being. These items were placed in this order to maximize predictive validity of the process by emphasizing certain measures at earlier or later stages of decision making. The flow of decision points can be seen in Figure 4 looking from top to bottom. Judgment calls were made by extracting data from the recursive partitioning to observe relative weightings of factors. Appeal to the published literature on how each of these factors associate or correlate with student academic success was also used to sort factors (Angkustsiri et al., 2012; Bearden et al., 2004).

Important for understanding the intent of the *Academic Mainstreaming Decision Tree* is the operation difference between inclusion and mainstreaming used in this manuscript. The broad generally accepted approach to inclusion and mainstreaming are described below.

Inclusion is the process of giving a student in special education access to the general education classroom to comply with LRE. For students with disabilities, advantages to this process are the opportunity to form friendships with their peers from whom they would have been separated if educated in a separate classroom. It allows students with disabilities to interact with non-disabled students to the benefit of all; they will all learn how to work together, gaining invaluable skills for the future. Students taught in a classroom with inclusion will learn to be more accepting and respectful of people from different backgrounds.

Mainstreaming is the term used to describe integrating students with disabilities into regular learning environments. Mainstreamed students have high potential for success, but it is vital that they receive support personalized for their needs by their IEP team. It is bringing special education services to the child rather than removing the child from the regular classroom. Some benefits of mainstreaming often include higher academic success, increased self-esteem and more astute social skills.

To be more explicit, the operational definitions used by the present *Academic Mainstreaming Decision Tree* and *Mainstreaming Process* are as follows:

- *Inclusion* refers to *social* access to peers in a general education classroom. Assignments are often highly modified for inclusion (assignment modification means entirely different materials or assignments that reduce the expectations on student achievement or alteration to the required curriculum). A student can receive full day special education services in a general education classroom via push-in services and not share any academic goals, demands, or instruction with their general education peers and still be receiving "full inclusion". This is often why the term inclusion will be used to describe both a general education classroom that has disabled students attend as well as the special education classes themselves and specialized schools (*i.e.*, "inclusive schools").
- *Mainstreaming* refers to *academic* access to the general education classroom. Assignments, tests, and curriculum have to be the same as general education

peers or slightly adapted/accommodated (meaning the expectations for achievement and curriculum requirements remain the same, but the assignment can be changed by response mode or reduction of work load to facilitate student success), but cannot be modified. In this way, a student mainstreaming in a general education classroom will be receiving academic instruction with their general education peers and, as a result, will be receiving *fewer* special education services as a result of their mainstreaming.

The reason we focus on these definitions is that the intent of the verbiage in IDEIA (2004) is that students receiving special education receive as much of their academic education in a general education classroom as is possible for the student. This is not only for the social benefits, but for the students to have access to the high quality instruction and high standards in the general education classroom. It is only in this way that students can show the necessary growth toward college and/or career readiness, which is the goal for special education as well as general education students.

### **2.2.1 Adaptive Function**

Adaptive function was emphasized because it underlies the practical, everyday skills needed to function and meet the demands of an individual's environment, including the skills necessary to effectively and independently take care of oneself and interact with other people (Oakland & Harrison, 2011). Intact adaptive skills are crucial to achieving success in a general education classroom environment. Adaptive Function was chosen as the first decision point because of its pivotal role in behavioral flexibility when encountering novel or difficult situations. Adaptive function is an individual's competence of social and practical daily living skills (De Bildt, Sytema, Kraijer, Sparrow, & Minderaa, 2005; Ditterline, Banner, Oakland, & Becton, 2008; Gresham & Elliott, 1987). Adaptive skills are necessary for an individual to adjust their behavior to novel situations or contexts (*i.e.*, change inappropriate behaviors to more appropriate ones given a change to the encountered situation).

Having adaptive function as the first decision point makes the *Academic Mainstreaming Decision Tree* rather conservative so far as taking student coping skills and adaptability into account. Low adaptive composite standard scores result in initially placing the student in more restrictive settings with increased behavioral and academic supports. Once the student responds favorably with these supports, the student progresses toward increasingly less restrictive educational settings. An important note is that if the student appears to show a relative adaptive strength in the sub-measures of adaptive function that relate to schoolwork, that relative strength may be taken into account to generate an alternative path down the *Academic Mainstreaming Decision Tree*.





Intellectual Abilities (Full Scale IQ) were given lower priority relative to adaptive function simply because a low IQ can be unduly influential if included as the first step of a decision making process. Decades of research suggest IQ measures can be poor predictors or correlates of cognitive ability and academic success in developmentally disabled populations that are well represented in special education classrooms (*e.g.*, spina bifida, autism, and 22q11.2DS; Biswas and Furniss, 2016; Dennis et al., 2009; Nader et al., 2014; Popa et al., 2014). In fact, it has been repeatedly demonstrated that there are systematic biases in IQ tests, with many underestimating cognitive abilities more than others (examples for Stanford-Binet V and WISC-III/IV systematically underestimating cognitive abilities in autism *cf.*, Barbeau, Soulieres, Dawson, Zeffiro, and Mottron, 2013; Courchesne, Meilleur, Poulin-Lord, Dawson, and Soulieres, 2015; Dawson, Soulieres, Gernsbacher, and Mottron, 2007; Nader, Courchesne, Dawson, and Soulieres, 2016).

### **2.2.3 Academic Achievement**

Academic Achievement was chosen to be the next decision step. We focus on the Woodcock-Johnson III Norms Updated (WJ-III NU) and Woodcock-Johnson IV (WJ-IV) because these assessments were the primary tool to assess academic achievement in school districts in Utah at the time of this writing.

The WJ-III NU Tests of Achievement were widely used to assess students for learning disabilities and the resulting data were useful for determining if the students qualified for specialized services. The WJ-III NU Tests of Achievement uses clusters of tests that directly parallel critical learning goals outlined by IDEIA and provide procedures for determining discrepancies between student potential and achievement. Curriculum based measures were used as direct measure for classroom performance relative to peers in general education environment (Edwards & Oakland, 2006; Taub & McGrew, 2004; Wu, West, & Hughes, 2008).

However, the use of appropriate curriculum based measures often gives a more complete snapshot of academic achievement by directly measuring academic skills in the classroom (Mathes et al., 1998). Specifically, with the increasing prevalence of grade-wide common formative assessments (CFA) in the general education classroom, these can be even more reliable and up-to-date indicators of success than standardized summative achievement tests students are given either annually or every third year (Dunn & Mulvenon, 2009; Heritage, 2007; Mathes et al., 1998). As such, curriculum based measures were given priority over achievement scores from the WJ-III NU when there was a discrepancy.

### **2.2.4 SocioEmotional Well Being**

Academic problems, along with problems associated with developing and maintaining positive relationships with others, are often the result of underlying behavioral and emotional challenges. These challenges, when identified and addressed sufficiently



early, can be corrected before negatively affecting a child or adolescent (Raines et al., 2012; Reid, Gonzalez, Nordness, Trout, & Epstein, 2004).

SocioEmotional Well Being is the final decision point in the Academic Mainstreaming Decision Tree. This was intended to quantify anxiety and/or emotional self-regulation that deleteriously impact classroom performance. Behavioral and conduct problems that require behavioral intervention can be considered as well at this step (*e.g.*, Behavioral Symptoms Index (BSI) on the BASC-2/3 or Conduct Problems on the Connors 3 and/or Achenbach CBCL). These data were included because behavioral and emotional functioning of children and adolescents are often effective measures for predicting student success (Wiesner & Schanding, 2013).

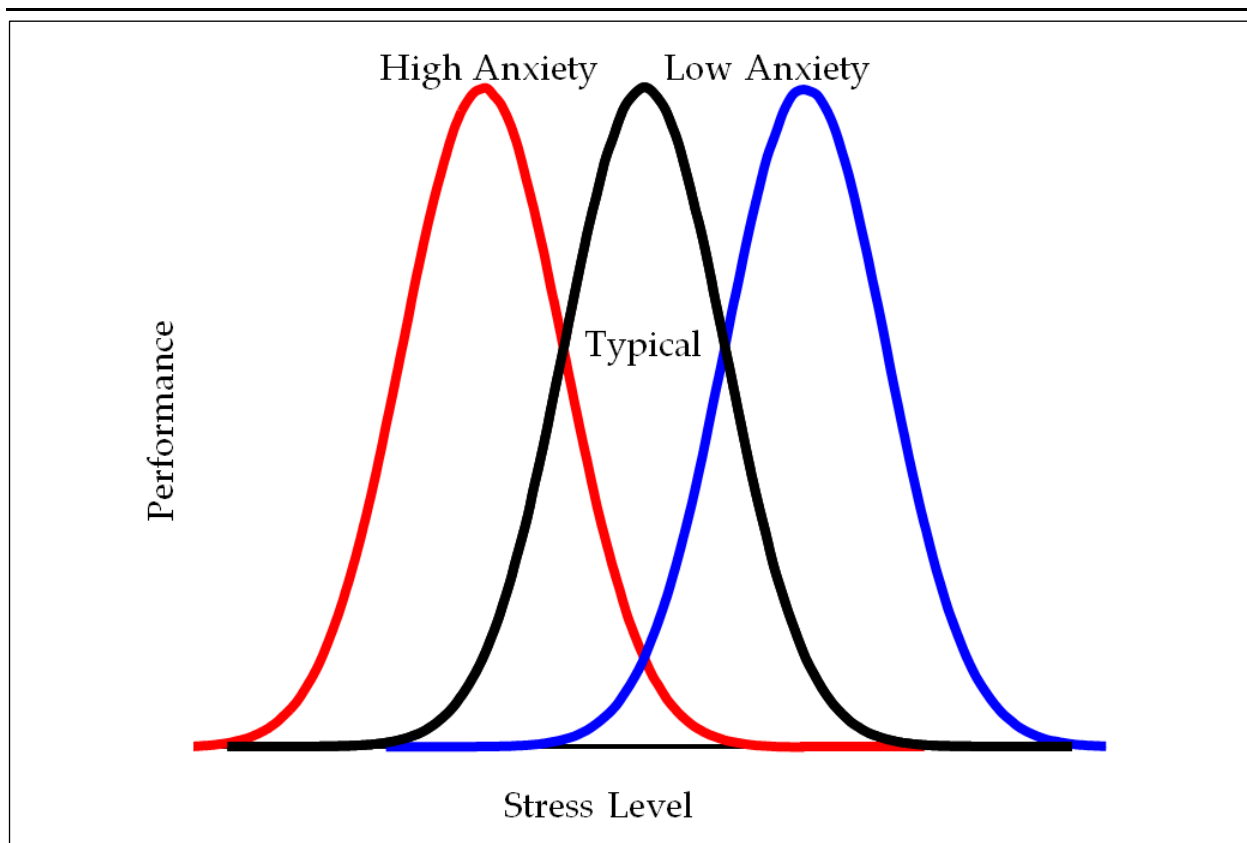
The decision to place SocioEmotional Well Being as the final decision step was deliberate. Once the other factors have been accounted for in the decision making process, this step modulates earlier decisions by placing the student in either a slightly more or less restrictive environment based upon their anxiety and/or social, emotional, behavioral profiles. In other words, SocioEmotional Well Being was used explicitly to provision increased support for the student if needed to prevent student perception of being overwhelmed by the level of challenge in the classroom. The working model used to describe the role of anxiety or behavioral disorders on student success was based on the Yerkes-Dodson inverted U Function (*cf.*, Figure 5; Cohen, 2011; Cooray and Bakala, 2005; Yerkes and Dodson, 1908).

### **2.2.5 Provisioning Academic Support**

Whether to initially place the student in a more or less restrictive environment is the result of the Academic Mainstreaming Decision Tree. As seen in Figure 4, the Academic Mainstreaming Decision Tree results in candidate placements for inclusion or mainstreaming and suggests a level of restrictive environment that will be appropriate for each student. As students exhibit increased independence, academic and behavioral supports can be gradually faded back, resulting in movement toward a less restrictive environment (*i.e.*, toward full independence in the general education classroom).

Fading back supports is done in two phases, behavioral and academic- with behavioral scaffolds being released first. For both academics and behavior, the first step is to fade supervision based on least restrictive environment. This means reduced access to inclusion/mainstreaming paraeducators until the student achieves independence. The next step was to provide specific incentives for continued academic and behavioral successes.

If students require greater supports in order to be successful, then more supports and scaffolds can be added, moving the student into more restrictive environments that require less student independence. To scaffold behavioral success, the first step is to provide incentives to build on achieved successes. Then, if necessary, provide behavioral support in the form of a paraprofessional. These supports can take the form of social skills, emotional, or behavioral interventions



**Figure 5:** Yerkes-Dodson Inverted U Function applied to anxiety after (Yerkes & Dodson, 1908). There was a clear relationship between stress and performance, with more stress (or challenge) being required to increase performance up to a point. After that point, there was too much stress and performance decreases. The middle curve line is a model curve for a “typical” student. The high anxiety student line (e.g.,  $T_{\text{anxiety}} > 70$  on BASC 2) shows that student performance peaks at lower stress levels. This suggests the students need increased support to shift the curve rightward where the typical curve is located. Low anxiety student performance peaks at higher stress levels. This suggests they need to be pushed and challenged to shift the curve leftward to where the black curve was located, as they are showing poor performance at “typical” levels of perceived stress.

To provide academic scaffolds, the first step is to provide incentives for continued academic success. If needed, assignments are adapted (assignments and grade level expectations are still *never* modified). Finally, pull-out or push-in academic services are provided to bridge knowledge gaps as needed.

### 2.3 Behavioral Mainstreaming Decision Tree

In parallel with profiling a student’s academic needs using the *Academic Mainstreaming Decision Tree*, it is also necessary to quantify their behavioral needs. To accomplish this, we created a *Behavioral Mainstreaming Decision Tree* (Figure 5 and Appendix D). This was designed for mainstreaming decisions for students in SocioEmotional Learning/Emotional Disturbance/Behavior unit classrooms.

Similarly to how the *Academic Mainstreaming Decision Tree* relies on data rather than teacher or student judgment, the *Behavioral Mainstreaming Decision Tree* focuses on behavioral data easily collected by the classroom teacher and validated by other faculty or staff as fidelity checks. What the *Behavioral Mainstreaming Decision Tree* does not do, however, is rely on classroom contract or level systems for inclusion/mainstreaming determination (Iwata & Bailey, 1974; S. W. Smith & Farrell, 1993). This decision was made to mitigate the influence of bias on the part of classroom teachers or paraeducators when marking contracts on mainstreaming decisions (*cf.*, Group, 1991; Ruth, 1996).

### **2.3.1 Seclusionary Time Out/Time Out Booth**

The first component of the *Behavioral Mainstreaming Decision Tree* is whether the behavior of the student requires use of seclusionary time out-/Time Out Booths or Physical Restraint (also called *Forced Physical Guidance* or *Manual Restraint* in some LEA). The use of these emergency safety interventions is limited in most areas to instances where the behavior of the student is an *immediate and significant danger* to themselves or others. Only the cases of seclusionary time out was used as an Emergency Safety Intervention were considered for the *Behavioral Mainstreaming Decision Tree*. All other uses were recorded separately and staff was retrained on use of these interventions. If a student requires the use of these interventions, they require instruction in social skills and SocioEmotional self-regulation prior to attempting any mainstreaming or social inclusion.

### **2.3.2 Physical Aggression**

The second component of the Behavioral Mainstreaming Decision Tree is whether the student engages in physical aggression. Importantly, this does not include property destruction. A student destroying property and a student attacking another person are very different things and should not be confounded. Physical aggression includes punching, kicking, slapping, head-butting, using chairs, pencils, etc. as weapons to hit another, spitting on, or biting another person.

Importantly for this component, I differentiate between a physical aggression even if the student was provoked by another student or teacher in the room and those when the student aggresses without clear provocation. Provocation in this sense includes peers or adults making physical contact with a student or restricting their movement. Similarly, peers or adults using "fighting words" to escalate a student or specifically trigger them is considered provocation.

### **2.3.3 Inappropriate Vocalizations**

The third decision point is that of inappropriate vocalizations. If a student engages in pervasive inappropriate language or vocalizations they will be considered for a more restrictive mainstreaming placement compared to if they do not. For this decision point,

inappropriate vocalizations include very specific things: they include screaming used to back off adults or teachers. They also include using specifically coarse and vulgar language.

For clarity, this means if a student is generally talking about Slenderman or killing or hurting someone that does not count as an inappropriate vocalization so long as it is not a credible threat. If a student uses words like damn, shit, bitch, bastard, fart, poop, etc. I do not count these, regardless the community standards. If students use words like fuck, cunt, cock, anatomically accurate or crass description of sex organs, explicit or accurate descriptions of rape, torture, etc. I do consider these inappropriate vocalizations. I draw this line where I do as the latter set of vocalizations do not tend to go away in a new environment and with minimal instruction to the student on community standards. The former do. Basically, if students are using vulgar, sexually explicit, or language not easily observable on broadcast television, the use of that language is an intentional, conscious choice and the student will require significant intervention prior to being placed in a stressful situation with other students.

### **2.3.4 Provisioning Behavioral Support**

Similarly, to the Academic Mainstreaming Decision Tree, the next component is to choose the level of support necessary for mainstreaming. Mainstreaming/IEP team meetings should happen biweekly to determine if a more or less restrictive environment is necessary for student success. As students exhibit increased independence, academic and behavioral supports can be gradually faded back, resulting in movement toward a less restrictive environment (*i.e.*, toward full independence in the general education classroom).

Fading back supports is done in two phases, behavioral and academic- with behavioral scaffolds being released first. For both academics and behavior, the first step is to fade supervision based on least restrictive environment. This means carefully reducing access to inclusion/mainstreaming paraeducators as the student achieves increasing levels of self-sufficiently and independence. The next step was to provide specific incentives for continued academic success and behavioral successes.

If students require greater supports in order to be successful, then more supports and scaffolds can be added, moving the student into more restrictive environments that demand a lower level of student independence. To scaffold behavioral success, the first step is to provide incentives to build on achieved successes. Then, if necessary, provide behavioral support in the form of a paraprofessional. These supports can take the form of social skills, emotional, or behavioral interventions.

To provide academic scaffolds, the first step is to provide incentives for continued academic success. If needed, assignments are adapted (assignments are still never modified). Finally, pull-out or push-in academic services are provided to bridge gaps as needed.

Critically, if the two different decision trees (academic and behavioral) result in different levels of restrictive environment, the team will meet to harmonize the differences between the results and what placement is in the best interest of the students.

## **2.4 Mainstreaming Process**

Once candidate students were identified and placed in an appropriate setting for inclusion/mainstreaming using the Academic Mainstreaming Decision Tree, then a specific transenvironmental programming process needs to put into place to guide students toward success in increasingly less restrictive environments. This pipeline was designed to simultaneously build student confidence and ability by stretching and challenging them both academically and behaviorally while providing sufficient scaffolds and support to prevent student failure. To achieve effective transenvironmental programming methods, we developed a 7-step Mainstreaming Process based on previous research (Fuchs et al., 1994b; Fuchs et al., 1993; Marden, 2013; Mathes et al., 1998; Wadsworth & Knight, 1999).

### **2.4.1 Step 1 - Identify Candidate Students**

As described above, candidate students were identified with the Academic Mainstreaming Decision Tree using broad Adaptive scores (Adaptive Composite Standard Score from ABAS-II/ABAS-3 or VABS-II/VABS-3 or else adaptive T-score on BASC2/3), Full Scale IQ (FSIQ; or NVIQ/VIQ as appropriate), Academic Achievement (CBM/CFA or WJ-III NU/IV), and SocioEmotional Well Being. To do this, a copy of the Academic Mainstreaming Decision Tree was printed and a highlighter was used to trace down the decision points for each student individually to identify initial inclusion/- mainstreaming placement options. The values at each decision point were annotated in a Mainstreaming Data Sheet (form available as Appendix E). In parallel, the student data and placement allocation was extracted from the recursive partitioning data to be compared with the Academic Mainstreaming Decision Tree.

Note, not at this point nor at any other point moving forward were special education classification, medical diagnoses, mobility problems, speech issues, or anything else included in Table 2 considered as factors affecting placement decisions. Neither did teachers consider past difficulties in mainstreaming except as motivation for the development of behavioral plans to scaffold student success. The final element within this step was to write a very precise description of each student in terms of temperament and relative need for structure compared to peers (both comparisons to special education and grade level general education peers).

### **2.4.2 Step 2 - Identify Classroom Placements**

Once candidate students are identified, it becomes critical to identify grade level classrooms as placement options. There are two approaches to doing this: First, one can

identify teachers with a known history of working with special education. Second, one can refrain from limiting candidate classrooms to any given teacher, but look at all grade level classrooms to determine best placement options on a student by student basis.

The preferred option is to evaluate all grade level classrooms as candidate placements. This prevents issues associated with the special education department overwhelming a relatively small number of teachers with extra students while not impacting other classrooms within the school (Avramidis, Bayliss, & Burden, 2000; Barnes & Gaines, 2015; Mukherjee, Lightfoot, & Sloper, 2000). Additionally, all efforts were made to spread students in the same grade across classrooms rather than grouping them together. This was done for two reasons. The first being to prevent overloading a general education classroom with multiple potentially burdensome students. It was emphasized that best practices were to keep the natural ratios of general education to special education students intact; meaning 10-15% of any class could be special education students, but no more. The second reason was to foster independence by challenging the special education students in a new environment without being able to use their peers as a crutch for either bad behavior or seeking help instead of persevering during academic tasks. Any teacher-student personality considerations based on the profile completed in Step 1 should be addressed with the building administrator prior to moving forward with any placements.

### **2.4.3 Step 3 - Classroom Ecological Inventory**

This step involves harmonizing the special education and general education environments to maximize the potential for student success. It was based strongly on the evidence based transenvironmental programming methods employed by the Peabody Reintegration Project and refined by Fuchs and colleagues (Fuchs et al., 1994b; Fuchs et al., 1993; Marden, 2013; Mathes et al., 1998; Wadsworth & Knight, 1999).

The individual steps/components to this Classroom Ecological Inventory process are as follows:

1. Special education teacher (or district facilitator/coordinator) observes candidate general education classrooms to identify any issues that will limit success as well as identify classroom factors that will increase probability of student success.
2. The special education and general education teachers independently complete a shared ecological inventory for their classrooms that can be used to identify any discrepancies in classroom environment that may impact student success (modified after previous examples in the literature; Fuchs et al., 1994b; Marden, 2013). In other words, the special education and general education teachers describe their classroom environment, expectations, management styles, etc. The form developed for the Mainstreaming Process is available as Appendix F.

3. Any discrepancies among the different teachers' responses to the inventory were identified and discussed to identify and anticipate potential difficulties for the student moving forward.
4. The general education and special education teachers meet and discuss plans/solutions to potential difficulties for the student based on the data from the ecological survey. The most common issues observed were increased rigor of curriculum in general education compared to special education, insufficient student independence in special education, and different curricula between special education and general education. The most commonly proposed solutions were planned accommodation of assignments (to be faded over time), increasing academic rigor in the special education classroom as the student is transitioning to the general education context, and special education classrooms increasing homework load prior to the transitions so the student develops the academic skills required by homework.
5. The special education and general education teachers specifically plan classroom accommodations for moving forward. This step involves a number of informal meetings and an in depth conversation as to precise expectations regarding student performance in the general education classroom. The district facilitator often had to intervene at this stage to verify that expectations for the special education student were both realistic but also aligned to expectations for the other students in the classroom.

Critically, it was emphasized that there could be zero assignment modification during any step of the mainstreaming process. Assignments could be adapted so the student could access the curriculum (*e.g.*, change response mode or reduce total work load), but no expectations for curriculum or content mastery could be reduced. This emphasis was placed because it has been shown that excessively modifying assignments and reducing expectations for content mastery impede long term transition out of special education, whereas appropriate accommodations that maintain high content mastery expectations increase the probability of future success and a reduction in the need for future accommodations (Fisher, Frey, & Thousand, 2003; Fuchs, Mock, Morgan, & Young, 2003; Hollenbeck, Tindal, & Almond, 1998).

#### **2.4.4 Step 4 - Initiate Student Placement in General Education Classroom**

The Academic Mainstreaming Decision Tree can be used to identify the specific needs of the student for support levels. It is only at this time point in the process that the need for paraeducator allocation and student specific behavior plans are explicitly discussed.

The student is placed in the general education classroom for ~50% time to begin (unless the IEP team decision was to start with a greater percentage of time). Upon beginning to attend the mainstream classroom, the special education teacher begins data collection on student independence using a Mainstreaming Data Sheet (Appendix D). Data collection on independence, levels of accommodation necessary for student

success, and classroom behavior were also collected by a district facilitator/coordinator. Behavioral data sheets used during this implementation are available as editable digital files by request or available for download at <https://github.com/mrhunsaker/BehavioralFirstAid/> under a GNU General Public License v3.0.

#### **2.4.5 Step 5 - Transition from Part-Time to Full-Time General Education**

Student time is increased in the general education class until they independently participate 90-100% of the time in the general education class- room and/or Resource classroom prior to moving toward a re-evaluation / placement change. Any increases of student time in general education classroom or movement in the direction of transitioning toward change of placement are based on the following factors: 1) Independence as quantified by a Mainstreaming Data Sheet, 2) Classroom observations, 3) Work completion, and 4) Academic progress, primarily referring to how much accommodation the student needs (*i.e.*, whether or not the student completes coursework with the same assignments as peers receiving only part time special education/resource services). This final criteria is important because the majority of students transitioning out of self-contained class- rooms will need part time special education/resource services to achieve success.

#### **2.4.6 Step 6 - Formal Transition from Special Education to General Education**

The IEP team performs an official data review to determine how to proceed with a change of placement. Additional academic testing can be administered (*e.g.*, WJ-III NU/IV) as part of a re-evaluation to elucidate present levels of academic functioning and performance if CBM benchmarks and CFA performance were insufficient. These results guide IEP goal development and to elucidate appropriate levels of part time special education/Resource services.

During this transition, the IEP team develops all necessary behavior plans, contracts, trackers, etc. Any plans or contracts must be designed to fit seamlessly into the school PBIS framework or other school- wide discipline system.

#### **2.4.7 Step 7 - Transition from Unit School to Neighborhood School**

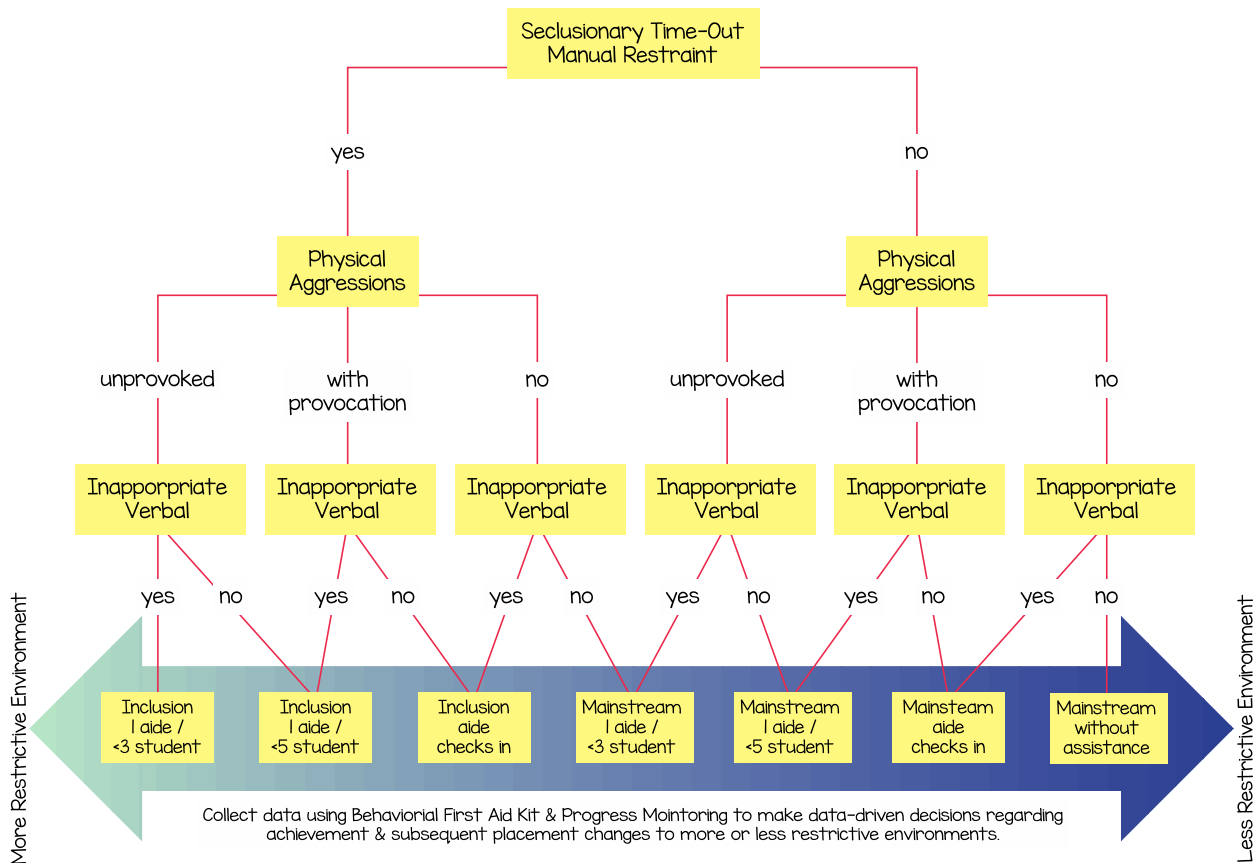
At the end of the year, there should be a transition meeting between the IEP team and the student's neighborhood school to discuss necessary accommodations, successes, challenges, etc. The following issues need to be discussed: 1) Transition plans: decisions need to be made whether the student returns to their neighborhood school or stay at the school wherein they attended the self-contained classroom. 2) Staffing issues across both schools: It is imperative the schools verify that the impact of any given student or group of students transitioning from one environment to another will not overwhelm individual teachers or grade levels the subsequent year. However, lack of special educators, paraeducators, or other staffing issues was considered an insufficient reason



to prevent moving students back to their neighborhood schools (*i.e.*, no student was left in a special class placement because the neighborhood school did not have sufficient resources). This is a discussion among the building administrators of the individual schools and district facilitators (not the special education teachers). Finally, 3) What transitional assistance the next school year by district facilitator/coordinator should look like.

The two school teams need to develop a set of transitional IEP goals to scaffold the student into a new school/grade/placement, preferably with goals geared toward full student independence in the general education classroom. Additionally, there needs to be a conversation regarding how often a district facilitator/coordinator explicitly checks in on transitioned students at their new school.

### Behavior Mainstreaming Progress Decision Tree



© 2017 Michael Ryan Hunsaker, Ph.D. - Behavioral Mainstreaming Decision Tree

**Figure 6:** Behavioral Mainstreaming Decision Tree. The Behavioral Mainstreaming Decision Tree is a visual depiction of the data-driven decision making process used to identify candidates for transition from self-contained special education to general education with part time special education/Resource services placements. Data regarding behavioral performance in self-contained and general education classroom are collected and taken into account. Biweekly meetings are held to determine if student needs more or less restrictive environments. Along the bottom are the spectrum of restrictive environments ranging from inclusion with an aide on the left to independent mainstream access to the general education classroom on the right.

### 3. Results

#### 3.1 Student Allocation Using Academic Mainstreaming Decision Tree

To determine the validity of manually placing students into groups to receive mainstreaming or to receive social inclusion, a computational analysis was undertaken. This analysis used the results of the regression trees above and used those data structures to sort students into 2 groups, Mainstreaming and Inclusion. In some computational analyses the computer returned a third group of outliers that were "higher" than predicted. These were labeled GenEd for general education simply for display purposes.

In order to quantify the accuracy of the clustering approaches, a machine learning classification algorithm was employed. This method, called Support Vector Machines, is designed to identify an optimal separation among groups or classes of data.

The algorithm was trained by using different numbers of data points (students) to train the algorithm and testing it with the rest of the datasets. This analysis confirms the correctness of the heatmaps as well as trains a computer to discriminate among the 3 classes of students, allowing for unknown students' data to be input and a classification be elucidated. Based on preliminary exploratory analyses, a linear kernel resulted in the most accurate sorting of students. Effort was taken to avoid over-fitting the data.

K-means cross validation was used as a training and evaluation metric for the Support Vector Machine. In k-fold cross-validation, the original sample is randomly partitioned into k equal sized subsamples. Of the k subsamples, a single subsample is retained as the validation data for testing the model, and the remaining k-1 subsamples are used as training data. K means cross validation with K=30, 20, 10, 5, and 3 were used to evaluate the efficacy of the algorithm. As such, 30-fold cross validation uses a smaller training set than a 10- or 5-fold cross validation (3 vs 10 and 20 respectively).

The *e1071* package was used to implement the support vector machine algorithm. To train the classifier the code was replicated 1000 times without replacement.

```
1 # For k=30 fold cross validation :
2
3 library ( e1071 )
4
5 svm. fit30<-replicate (1000 , svm( Outcome ~ Adaptive + FSIQ + WJIII + CBM
  + SocioEmotional , data = na.omit (merged data ) , kernel = "linear" , cross
  = 30 , probability = TRUE) , simplify = "matrix ")
6
7 print ( svm. fit30 [ 29 , ] )
8
9 # For k=20 fold cross validation :
10
11 svm. fit20<-replicate (1000 , svm( Outcome ~ Adaptive + FSIQ + WJIII + CBM
  + SocioEmotional , data = na.omit (merged data ) , kernel = "linear" , cross
  = 20 , probability = TRUE) , simplify = "matrix ")
12
13 print ( svm. fit20 [ 29 , ] )
14
15 # For k=10 fold cross validation :
16
17 svm. fit10<-replicate (1000 , svm( Outcome ~ Adaptive + FSIQ + WJIII + CBM
  + SocioEmotional , data = na.omit (merged data ) , kernel = "linear" , cross
  = 10 , probability = TRUE) , simplify = "matrix ")
18
19 print ( svm. fit10 [ 29 , ] )
20
21 # For k=5 fold cross validation :
22
23 svm. fit5<-replicate (1000 , svm( Outcome ~ Adaptive + FSIQ + WJIII + CBM +
  SocioEmotional , data = na.omit (merged data ) , kernel = "linear" ,
  cross = 5 , probability = TRUE) , simplify = "matrix ")
24
25 print ( svm. fit5 [ 29 , ] )
26
27 # For k=3 fold cross validation :
28
29 svm. fit3<-replicate (1000 , svm( Outcome ~ Adaptive + FSIQ + WJIII + CBM +
  SocioEmotional , data = na.omit (merged data ) , kernel = "linear" ,
  cross = 5 , probability = TRUE) , simplify = "matrix ")
30
31 print ( svm. fit3 [ 29 , ] )
32
33 # Overall comparison
34
35 overall.SVM<-cbind ( svm. fit30 [ 29 , ] , svm. fit20 [ 29 , ] , svm. fit10 [ 29 , ] , svm.
```

Note: in Table 4 that the classifier misclassified one (1) General Education student as Mainstreaming and zero (0) as inclusion. Three (3) inclusion students were misclassified as needing mainstreaming and zero (0) as needing fast-tracking into the general education classroom. Three (3) Mainstreaming students were misclassified as General Education and 2 were misclassified as requiring inclusion. These data are important because they demonstrate the algorithms are optimistic, erring on the side of moving the student to a less restrictive environment rather than favoring more restrictive environments. Also, these data provide computational support for classroom

decisions undertaken using the data from these analyses, which was to favor moving students into less restrictive environments as soon as they were approaching "ready", rather than waiting until everyone was certain the student or multiple students were ready and would succeed (this is analogous to the zone of proximal development; *cf.*, Zaretskii, 2009). Efficacy of the K-means classifier across multiple runs are shown in Fig 7.

An independent analysis taking the raw data used by the Regression Tree algorithm but using a different clustering algorithm was also performed. This analysis was performed using the *heatmap.2* library in the R statistical computing package. Preliminary analyses evaluated the data school by school, but there were no differences from the analyses using the omnibus dataset. So to preserve rigor, we only report the grouped data. The results of these analyses were heatmaps that showed similarities among students as well as similarities among factors.

Once the *heatmap.2* code was executed, the resulting hierarchical clustering-based visualizations were saved to file and remained unaltered. A deliberate choice was made to not cut the heatmaps or post process them for the sake of clarity.

The *heatmap.2* code for a combination of the four schools (8 class-rooms):

```
3 library ( RColorBrewer )
4 library ( dendextend )
5
6 ## Combine all data into a single data matrix
7
8 merged data<-rbind ( School1data , School2data , School3data , School4data )
9
10 Overallclusterdata< subset ( merged data , select=c ( FSIQ , Basic Reading
    Skills , Reading Comp , Math Calc , Math Reasoning , Written Lang ,
    Adaptive , SocioEmotional , CBM Math , CBM Reading ) )
11
12 Overallmydata<-as . matrix ( Overallclusterdata )
13
14 Overallmydata<-na . omit ( Overallmydata )
15
16 # Set up dendrograms to color groups for Rows
17
18 distanceROW= dist ( Overallmydata , method= " euclidean " )
19
20 hclusterROW<-hclust ( distanceROW , method= " ward .D" )
21
22 cols branchesROW <-c ( " #e66101" , " #5e3c99 " , " #f1a340 " )
23
24 dendROW<-color branches ( hcluster , k=3 , col = cols branchesROW )
25
26 # Set up Dendrograms for or columns ( Requires transposing the data
    matrix )
27
28 for clustering<-t ( Overallmydata )
29
```

```
30 distanceCOL= d i s t ( f o r c l u s t e r i n g , method= " euclidean " )
31
32 hclusterCOL<-hclust ( distanceCOL , method= " ward .D" )
33
34 col s branchesCOL<-c ( " red " , " darkgreen " , " blue " )
35
36 dendCOL<-co l o r branches ( hclusterCOL , k=3, c o l = col s branchesCOL )
37
38 ## Overall Output i nto Heatmap
39
40 mypalette< colorRampPalette ( c ( " #e66101" , " #af8dc3 " , " #e7d4e8 " , " #d9f0d3 " ,
    " #7fbf7b " , " #1b7837" ) ) ( n=256)
41
42 heatmap . 2 ( Overallmydata , main= " Mainstream Decision Tree Clustering " , c o
    l=mypalette , scale= " column" , cexRow=.75 , cexCol =1,margins=c ( 10 ,10) ,
    RowSideColors=RowColors , Rowv=dend1 , Colv=dend2 , labRow=FALSE , rowsep=1:100,
    colsep =1:10 , sepcol= " white " , sepwidth=c ( .015 ,.025) , trace= " none" , add . expr = c (
    abline ( h = c ( 67.4 ,23.4) , lwd=4, c o l = " white " ) , abline ( v = c ( 3 . 5 , 5 . 5 , 6 . 5 , 8 . 5 ) ,
    lwd=4, c o l = " white " ) ) )
```

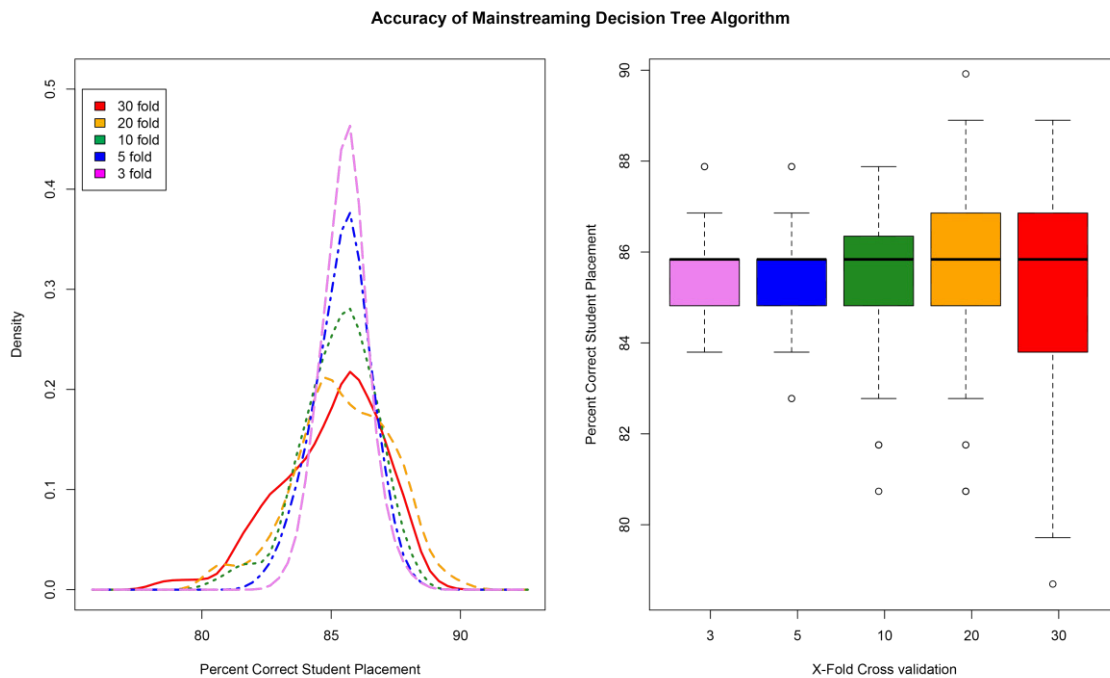
The data presented in the heatmap in Figure 8 show that there was less correct classification of students designated for mainstreaming or inclusion compared to Academic Mainstreaming Decision Tree (as evidenced in Table 4). Interestingly, one can also see the Cognitive factors were separated from the academic factors, and CBM measurements were included as cognitive, rather than academic factors. Interesting to note, the students misclassified by the SVM analyses were misidentified the same way using this clustering algorithm. Looking at the patterns of data, it appears that CBM performance was more influential during the clustering than the SVM analyses, likely leading to the disparate clustering of students. Notwithstanding these differences, the data from these computational analyses all support the use of the *Academic Mainstreaming Decision Tree* by reaching similar conclusions as to student allocation or classification as the *Academic Mainstreaming Decision Tree* using a converging method.

Michael Ryan Hunsaker  
 DEVELOPMENT, VALIDATION, AND IMPLEMENTATION OF  
 A MAINSTREAMING PROCESS TO TRANSITION STUDENTS FROM SELF-CONTAINED  
 SPECIAL EDUCATION INTO GENERAL EDUCATION PLACEMENTS

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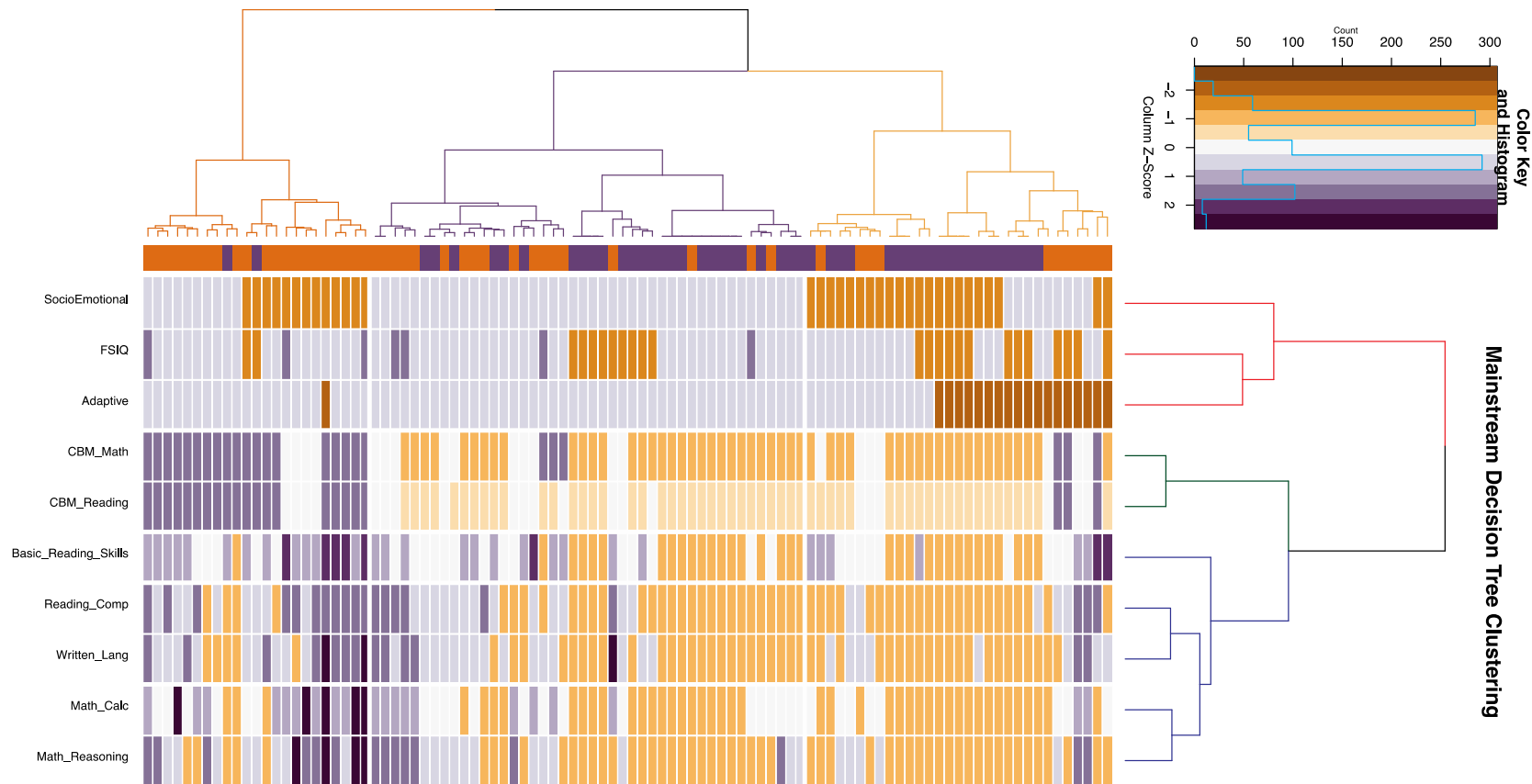
Table 4: Overall Mean Accuracy of the Support Vector Machine Classifier with k-Fold Cross Validation

<u>Manual Placement</u> ⇒	<u>General Education</u>	<u>Inclusion</u>	<u>Mainstreaming</u>	<u>% Correct</u>
<u>Classification</u> SVM Prediction ↓				
General Education	<b>21</b>	0	2	91%
Inclusion	0	<b>38</b>	3	87%
Mainstream	4	3	<b>24</b>	80%



**Figure 7:** Overall Predictive Validity of the Academic Mainstreaming Decision Tree The plot on the left shows the probability density of each support vector machine prediction trained by K-fold cross validation. As can be seen, the 3 and 5 fold outperformed the other values for consistency, showing the sharpest peak. For clarity, the plot on the right contains each of the 1000 training sessions for the k-fold cross validation and are presented as Tukey boxplots with the 1.5 interquartile range (IQR) as the whiskers. The outlying data points were not removed. For all k-fold cross validations, the mean accuracy was similar, but the spread among the data points increased with the number of k-folds used.

Michael Ryan Hunsaker  
 DEVELOPMENT, VALIDATION, AND IMPLEMENTATION OF  
 A MAINSTREAMING PROCESS TO TRANSITION STUDENTS FROM SELF-CONTAINED  
 SPECIAL EDUCATION INTO GENERAL EDUCATION PLACEMENTS



**Figure 8:** Unsupervised Hierarchical Clustering. When all data are put together and allowed to self assemble using a greedy algorithm, three groups emerge. Along the left, the bottom, dark orange cluster corresponds to students that successfully entered a general education placement. The top, light orange cluster corresponds to students that were assigned to >75% mainstreaming. The middle purple cluster are students that were allocated to a group receiving social inclusion. Along the top, the nonacademic factors clustered together as highly related and predictive of student placement. The green cluster corresponds to CBM measures, and the purple cluster correspond to the WJ-III NU factors, with reading/writing skills separated from math skills.



### **3.2 Results - 2015-2016**

In the first year / pilot implementation, we identified 20 students (17 male, 3 female - the ratio roughly matched the gender demographics in these special education classrooms) as candidates for transition from the self-contained classroom into a general education with part time special education placement using the Academic Mainstreaming Decision Tree. Ten (10) of these students were classified as Autism, six (6) as Significant Learning Disabled (SLD), two (2) as Speech and Language Impairment (SLI), one (1) as Emotional Disturbance (ED) and one (1) as Other Health Impairment (OHI). Students identified as candidates for transition from self-contained special education to general education placements ranged from 1st through 5th grade. 6th grade students were not included in the preliminary implementation.

The mean adaptive composite standard score for these 20 students was SS 73.2 +/- 10.37 (standard deviation - SD). The mean full scale IQ standard score was SS 93.3 +/- 10.34 SD. The mean WJ-III NU academic achievement standard scores were as follows: Reading Skills 86.72 +/- 16.1 SD; Reading Comprehension 80.21 +/- 15 SD; Math Calculation 79.1 +/- 24.3 SD; Math Reasoning 78.1 +/- 21 SD; Broad Writing 74.89 +/- 12.92 SD.

Overall, of the 20 students, 5 of the 20 candidate students had anxiety or BSI T scores  $T > 70$  on the BASC, Connor's, or CBCL (25%). The 20 students that were identified as potential candidates based on these scores from their special education files appeared to be a clear outlying group when compared to their peers across all measures.

Once identified, these students were observed for two weeks to identify any behavioral issues that could potentially impede access to the general education curriculum. At the same time, students were receiving in-class academic placement examinations to group or classify them into appropriate learning levels within their self-contained classroom. Many of these students were identified as already being able to access (or master) nearly all levels of the special education curriculum at the beginning of the year. All the students in the classroom were also administered district CBM benchmarks and many of the curriculum based measures listed in Table 1. Based upon success on these measures students were considered candidates for transition out of the self-contained special education classroom.

Profiles of all the students that were candidates for a transition from a self-contained special education classroom to the general education placement are presented in Table 5.

Four 5th grade students successfully transitioned from a self-contained special education placement to a general education with part time special education services placement. One (1) 5th grade student finished the year spending >75% time in the general education classroom. The IEP team proposed a transition during the next school year.

Two (2) 4th grade students successfully transitioned from a self-contained special

education placement to a general education with part time special education services placement. One (1) 4th grade student was unable to access the grade level CBM and was unable to transition into the general education environment. One (1) 4th grade student was unable to make this transition and requested they return to the self-contained classroom. One (1) 4th grade student demonstrated extreme behaviors in public spaces that prohibited access to the general education classroom. The latter two of these students began a program of explicit academic and social skills training in preparation for the upcoming school year.

Two (2) 3rd grade students were receiving access to the resource classroom rather than the general education classroom as this was considered the most appropriate placement for these students to learn academic skills necessary for an eventual transition into the general education classroom. Two (2) more 3rd grade students successfully transitioned from a self-contained special education placement to a general education with part time special education services placement. One (1) 3rd grade student was unable to access the grade level CBM and was unable to transition to the general education environment.

One (1) 2nd grade student successfully transitioned from a self-contained special education placement to a general education with part time special education services placement. Another two (2) 2nd grade students were able to handle between 50-75% time in the general education classroom and efforts were underway to explicitly teach academic and adaptive skills to them so they may pursue an eventual placement in the general education setting in subsequent years.

One (1) 1<sup>st</sup> grade student successfully transitioned from a self-contained special education placement to a general education with part time special education services placement. Another 1st grade student was able to handle between 50-75% time in the general education classroom. The IEP team proposed a transition during the next school year.

Michael Ryan Hunsaker  
 DEVELOPMENT, VALIDATION, AND IMPLEMENTATION OF  
 A MAINSTREAMING PROCESS TO TRANSITION STUDENTS FROM SELF-CONTAINED  
 SPECIAL EDUCATION INTO GENERAL EDUCATION PLACEMENTS

Student Information		Adaptive	IQ	Table 5: Profile of Candidate Students Identified Using the Academic Mainstreaming Decision Tree - Year 1 Academic Achievement					Emotional	Transition
Name	Class	GAC	FSIQ	Rd Skills	Rd Comp	Math Cal	Math Rsn	Writing	BSI	Results
Schools 1-2 - Mild/Moderate Academic Units										
Std A	OHI	60-76	NA	78	63	18	39	NA	NA	LRE TRANSITION
Std B	ED	83-100	90	102	88	116	108	92	86	LRE TRANSITION
Std C	AU	67-78	101	72	84	75	87	90	72	LRE TRANSITION
Std D	AU	85	71	86	87	97	87	83	>70	LRE TRANSITION
Std E	AU	84-106	116	92	56	91	77	79	<70	LRE TRANSITION
Std F	AU	83-94	95	85	98	84	86	74	74	LRE TRANSITION
Std G	AU	65-86	99	NA	NA	NA	NA	NA	<70	Poor Attention
Std H	AU	70-77	77	117	85	95	85	NA	>70	Behavior
Std I	SLD	81-84	81	87	81	78	90	NA	<70	Stress
Std J	SLD	91-94	100	69	63	84	74	NA	<70	Low Academics
Std K	SLD	73-88	98		74 (Broad Reading)		77 (Broad Math)	NA	<70	Stress
Std L	SLD	73	96	75	93	80	58	81	<70	LRE TRANSITION
Std M	AU	69-71	90	NA	NA	NA	NA	NA	NA	Apraxia
Std N	AU	67-83	92	105	98		29 (Broad Math)	NA	<70	Low Academics
Std O	SLI	80	54	119	68	90	88	79	<70	LRE TRANSITION
Std P	SLD	78-82	69-81	78	59	37	45	54	<70	LRE TRANSITION
Std Q	AU	66-70	80			We Can! Assessment			<70	LRE TRANSITION
Students in School B Scheduled for Transition in the Next School Year										
Std R	SLI	79-85	87			We Can! Assessment			52	Planned
Std S	AU	50	81			We Can! Assessment			69	Planned
Std T	SLD	NA	93-99	79	96	93	100	63	NA	Planned

### 3.3 Results - 2016-2017

In the second year of this pilot implementation, we identified 53 students (37 male, 16 female - the ratio roughly matched the gender demographics in these special education classrooms) as candidates for transition from the academic self-contained classroom into a general education with part time special education placement using the *Academic Mainstreaming Decision Tree*. 24 of these students were classified as Autism (AU), 15 as Significant Learning Disabled (SLD), 4 as Speech and Language Impairment (SLI), 2 as Other Health Impairment (OHI) (though one of these was OHI for a medical diagnosis of autism but parent did not want the "autism" label attached to their student), 1 as Traumatic Brain Injury (TBI), 1 as Orthopedic Impairment (OI), 2 as Emotional Disturbance (ED), 2 as Intellectual Disability (ID), and 2 as Developmental Delay (DD). Students identified as candidates for transition from self-contained special education to general education placements ranged from 1st through 5th grade. 6th grade students were included in this second year implementation.

The mean adaptive composite standard score for these 53 students was SS 76.12 +/- 15.45 (standard deviation - SD). The mean full scale IQ standard score was SS 87.40 +/- 13.04 SD. The mean WJ- III NU academic achievement standard scores were as follows: Reading Skills 89.88 +/- 17.20 SD ; Reading Comprehension 74.31 +/- 15.21 SD; Math Calculation 88.11 +/- 28.2 SD; Math Reasoning 72.98 +/- 19.71 SD; Broad Writing 76.98 +/- 14.81 SD.

Overall, of the 53 students, 12 of the candidate students had anxiety or BSI T scores T >70 on the BASC, Connor's, or Achenbach CBCL (22.6%). The 53 students that were identified as potential candidates based on these scores from their special education files appeared to be a clear outlying group when compared to their peers across all measures.

Once identified, these students were observed for two weeks to identify any behavioral issues that could potentially impede access to the general education curriculum. At the same time, students were receiving in-class academic placement examinations to group or classify them into appropriate learning levels within their self-contained classroom. Many of these students were identified as already being able to access (or master) all levels of the special education curriculum at the beginning of the year. All the students in the classroom were also administered district benchmarks and many of the curriculum based measures listed in Table 1. Based upon success on these measures, students were considered candidates for transition out of the self-contained special education classroom.

Profiles of all the students that were candidates for a transition from a self-contained special education classroom to the general education placement are presented in Table 6. For students carrying over across the first and second year of this pilot implementation, the alphabetical and numerical code are both presented in Table 6

### **3.3.1 Academic Self Contained Cluster Units**

There were seven (7) 6th grade student candidates. Four (4) 6th grade students successfully transitioned from a self-contained special education placement to a general education with part time special education services placement. An additional two (2) were able to spend 75-100% of the time in the general education classroom with minimal academic supports. One (1) required excessive behavioral supports in the general education classroom to spend more than 25% of their time out of the special education classroom.

There were thirteen (13) 5th grade student candidates. Three (3) 5th grade students successfully transitioned from a self-contained special education placement to a general education with part time special education services placement. Another 8 were able to access the general education classroom 50-75% of the time with minimal academic supports. Two (2) more were able to access the general education classroom 75% of the time when behavioral supports were present. There were five (5) 4th grade student candidates.

One (1) 4th grade student successfully transitioned from a self-contained special education placement to a general education with part time special education services placement. The other three (3) students were able to be in the general education classroom 50-75% of the time with minimal academic and behavioral supports. There were twelve (12) 3rd grade student candidates.

Three (3) 3rd grade students successfully transitioned from a self-contained special education placement to a general education with part time special education services placement. Another seven (7) students were able to spend 50-75% of the time in the general education classroom with minimal academic supports in place. The other two (2) students required excessive behavioral supports to spend more than 25% of the day in the general education classroom.

There were thirteen (13) 2nd grade student candidates. Four (4) 2nd grade students successfully transitioned from a self-contained special education placement to a general education with part time special education services placement. An additional two (2) were able to spend 75-100% of the time in the general education classroom with minimal supports and efforts were underway to explicitly teach academic and adaptive skills to them so they may pursue an eventual placement in the general education setting in subsequent years.

Six (6) students were able to access 50-75% of the day in the general education classroom if significant academic supports were provided. One (1) student requires extensive 1:1 behavioral support in the general education classroom and was mainstreamed 100% of the time, but was able to complete academic tasks. There were three (3) 1st grade student candidate. One (1) 1st grade student successfully transitioned from a self-contained special education placement to a general education with part time special education services placement. The other two (2) students required academic supports to spend 50% of the day in the general education

classroom.

### **3.3.2 Students in Other types of Unit Classrooms**

In addition to the academic cluster units, this model was extended to SEL/behavior unit and to severe/ID cluster units. In all, 26 students were identified as candidates for mainstreaming based on the Behavioral Mainstreaming Decision Tree. Of those, nine (9) were able to access the mainstream classroom 75-100% of the day and were able to successfully transition to a general education with part time special education placement. The other 17 were able to be in mainstreaming 25-50% of the time but lacked the SocioEmotional skills to obtain independence during the school year.

For the Life Skills/severe/ID cluster units, nine (9) students were identified as candidates for mainstreaming based on teacher report of CBM performance. All nine (9) of these students were able to access the mainstream curriculum and were able to transition to a general education with part time special education placement.

For diagnostic kindergarten students (academic self-contained kindergarten), seven (7) candidate students were identified. Of these seven, three (3) were able to access the mainstream kindergarten classroom >50% of the time and were transitioned to a general education classroom with part time special education. The other four (4) students had not yet developed the self-regulation skills to reliably spend >25% of their day in the mainstream setting.

Overall, of 94 candidate students across all special education settings, 41 were able to successfully transition into a general education with part time special education services placement for this coming year. In other words, 43% of identified candidate students were able to successfully transition from full time to part time special education. An additional ten (10) were able to access a less restrictive unit classroom (*e.g.*, Severe to Mild/Moderate cluster unit or SEL/behavior unit to Mild/Moderate cluster unit). This meant that 54% of identified candidate students were able to access a less restrictive environment as defined by IDEIA.

Michael Ryan Hunsaker  
 DEVELOPMENT, VALIDATION, AND IMPLEMENTATION OF  
 A MAINSTREAMING PROCESS TO TRANSITION STUDENTS FROM SELF-CONTAINED  
 SPECIAL EDUCATION INTO GENERAL EDUCATION PLACEMENTS

**Table 6:** Profile of Candidate Students Identified Using the *Academic Mainstreaming Decision Tree - Year 2*

Student Information		Adaptive		IQ		Academic Achievement			Emotional		Transition
Name	Class	GAC	FSIQ	Rd Skills	Rd Comp	Math Cal	Math Rsn	Writing	BSI	Results/Reason Given	
Schools 1-4 - Mild/Moderate Academic Units											
Std 1 / Std A	AU	74	61	93	65	75	73	111	69	Behavior	
Std 2	SLD	81-84	81	87	81	78	90	NA	54	Stress	
Std 3	SLD	91-94	100	69	63	84	74	NA	<70	Low CBM	
Std 4	SLD	73-88	98		74 (Broad Reading)		77 (Broad Math)	NA	<70	Stress	
Std 5	AU	69-71	90			--We Can! Assessment--			NA	LRE TRANSITION	
Std 6	AU	67-83	92	105	98	29 (Broad Math)		NA	<70	Poor Attention	
Std 7	AU	83	69	86	71	98	80	73	58	Poor Attention	
Std 8	AU	82	91	83	75	75	68	95	<70	LRE TRANSITION	
Std 9	SLD	82	82	90	70	90	80	80	65	Low CBM	
Std 10 / Std I	AU	88	98	75	55	83	56	70	54	Low CBM	
Std 11	ID	91	55	90	70	80	70	80	78	Behavior	
Std 12 / Std K	OHI	77	85	91	64	41	60	71	NA	Toileting	
Std 13 / Std R	SLI	79-85	87			--We Can! Assessment--			52	LRE TRANSITION	
Std 14 / Std S	AU	50	81			--We Can! Assessment--			69	LRE TRANSITION	
Std 15 / Std T	SLD	NA	93-99	79	96	93	100	63	NA	LRE TRANSITION	
Std 16	SLD	85	80	90	58	67	67	61	80	MAINSTREAMING	
Std 17	AU	80	83	84	74	70	80	74	>70	LRE TRANSITION	
Std 18	OHI	83	103	78	80	80	85	73	<70	LRE TRANSITION	
Std 19	ED	92	86	84	67	78	83	53	103	Behavior	
Std 20	AU	73	72			--We Can! Assessment--			45	LRE TRANSITION	
Std 21	AU	71	108	101	82	83	71	NA	85	LRE TRANSITION	
Std 22	AU	57	47			--Behavioral Characteristics Progression--			63	MAINSTREAMING	
Std 23	AU	79	61	99	87	NA	52	101	65	MAINSTREAMING	
Std 24	AU	87	82			--Behavioral Characteristics Progression--			NA	LRE TRANSITION	
Std 25	DD	74	80	NA	NA	NA	NA	NA	62	Low CBM	
Std 26	AU	68	70		65 (Broad Reading)		49 (Broad Math)	54	NA	LRE TRANSITION	
Std 27	AU	NA	82	90	72	68	69	92	77	Stress	
Std 28	OI	71	73	92	82	75	54	60	NA	LRE TRANSITION	
Std 29	SLI	100	97		77 (Broad Reading)		81 (Broad Math)	66	49	LRE TRANSITION	
Std 30	AU	55	68	120	62	73	55	71	98	Autism	
Std 31	ID	68	56	77	76	82	67	70	65	Low CBM	
Std 32	AU	78	81	111	89	90	72	93	77	Autism / Behavior	
Std 33	AU	76	79	75	94	0	61	NA	NA	Low CBM	
Std 34	AU	60	92	121	95	126	121	103	77	Autism / Behavior	
Std 35	SLI	76	96	87	75	109	81	NA	70	Low CBM	
Std 36	AU	93	107	83	80	101	77	92	53	LRE TRANSITION	
Std 37	SLD	NA	81	73	60	76	80	74	92	LRE TRANSITION	
Std 38	SLD	NA	NA	NA	NA	NA	NA	NA	NA	LRE TRANSITION	
Std 39	AU	98	112			--CBM--			75	Autism / Behavior	
Std 40	AU	71	83			--Behavioral Characteristics Progression--			74	Autism / Behavior	
Std 41	TBI	62	51			--Behavioral Characteristics Progression--			NA	Low CBM / Behavior	
Std 42	SLD	82	96	97	79	109	96	80	61	Autism / Behavior	
Std 43	AU	79	94	90	73	68	74	NA	NA	Low CBM	

Michael Ryan Hunsaker  
 DEVELOPMENT, VALIDATION, AND IMPLEMENTATION OF  
 A MAINSTREAMING PROCESS TO TRANSITION STUDENTS FROM SELF-CONTAINED  
 SPECIAL EDUCATION INTO GENERAL EDUCATION PLACEMENTS

Std 44	SLD	69	84	89	85	88	99	NA	93	MAINSTREAMING
Std 45	SLD	77	79	77	85	76	57	63	65	Low Academics
Std 46	SLD	79	113	72	63	72	60	63	NA	IN PROGRESS
Std 47	AU	78	96	103	78	99	71	82	60	MAINSTREAMING
Std 48	SLD	78	71	84	60	70	65	83	86	MAINSTREAMING
Std 49	SLD	NA	75	76	52	67	65	59	55	MAINSTREAMING

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Student Information		Adaptive	IQ	Academic Achievement					Emotional	Transition
Name	Class	GAC	FSIQ	Rd Skills	Rd Comp	Math Cal	Math Rsn	Writing	BSI	Results
Std 50	SLD	64	90	74	61	81	71	58	85	MAINSTREAMING
Std 51	AU	67	89	90	79	70	82	84	69	MAINSTREAMING
Std 52	SLI	90	87	70	67	63	60	73	75	MAINSTREAMING

Schools 5-7 - Mild/Moderate Behavior SEL Units

Std 53	AU	NA	83	102	91	96	99	95	72	Behavior
Std 54	AU	73	71	86	77	110	97	NA	NA	LRE TRANSITION
Std 55	AU	NA	72	109	85	111	95	NA	81	Behavior
Std 56	ED	NA	88	61	63	95	81	64	NA	LRE TRANSITION
Std 57	AU	70	70	88	74	36	63	77	99	LRE TRANSITION
Std 58	AU	NA	101	114	108	118	102	111	NA	LRE TRANSITION
Std 59	ED	NA	86	88	62	91	77	83	76	LRE TRANSITION
Std 60	ED	NA	87	96	89	95	104	106	68	Stress
Std 61	ED	NA	100	108	103	84	87	95	90	MAINSTREAMING
Std 62	ED	NA	87	102	79	90	99	91	96	LRE TRANSITION
Std 63	ED	70	72	68	NA	63	59	81	89	Behavior
Std 64	AU	77	82			--We Can! Assessment--			77	Behavior
Std 65	ED	NA	102	108	106	101	103	97	85	Behavior
Std 66	OHI	73	68			--We Can! Assessment--			68	Behavior
Std 67	ED	NA	66			--CBM--			77	LRE TRANSITION
Std 68	AU	71	80	98	83	93	84	86	91	LRE TRANSITION
Std 69	ED	NA	106	122	117	119	116	114	91	LRE TRANSITION
Std 70	ED	NA	NA	NA	NA	NA	NA	NA	83	Low CBM
Std 71	ED	NA	98	127	110	93	114	105	85	LRE TRANSITION
Std 72	ED	63/107	99	99	91	79	86	96	75	Behavior
Std 73	OHI	96	NA	NA	NA	NA	NA	NA	55	Behavior
Std 74	ED	NA	77	93	85	NA	NA	NA	64	Behavior
Std 75	AU	82	98	82	94	109	102	85	72	Behavior
Std 76	ED	NA	95	105	91	107	101	99	55	LRE TRANSITION
Std 77	ED	NA	92	112	90	96	96	92	84	LRE TRANSITION
Std 78	ED	NA	101	78	66	85	NA	98	61	LRE TRANSITION

School 8 - Mild/Moderate Diagnostic Kindergarten Unit

Std 79	DD	NA	77			--We Can! Assessment--			NA	Behavior
Std 80	DD	NA	57			--We Can! Assessment--			NA	LRE TRANSITION
Std 81	DD	NA	NA			--We Can! Assessment--			NA	Behavior
Std 82	DD	51	NA			--We Can! Assessment--			NA	Behavior



Michael Ryan Hunsaker  
 DEVELOPMENT, VALIDATION, AND IMPLEMENTATION OF  
 A MAINSTREAMING PROCESS TO TRANSITION STUDENTS FROM SELF-CONTAINED  
 SPECIAL EDUCATION INTO GENERAL EDUCATION PLACEMENTS

Std 83	DD	NA	61							NA	LRE TRANSITION
Std 84	DD	55	70							87	LRE TRANSITION
Std 85	DD	69	81							64	Behavior
School 9 - Severe ABA-Focus and Functional Life Skills Units											
Std 86	AU	64	55	<40	<40	<40	<40	<40		58	LRE TRANSITION
Std 87	AU	68	58	83	77	42	66	83		53	LRE TRANSITION
Std 88	AU	98	74		106		75	85		54	LRE TRANSITION
Schools 10-13 - Severe Functional Academics Unit											
Student Information		Adaptive	IQ	Academic Achievement					Emotional	Transition	
Name	Class	GAC	FSIQ	Rd Skills	Rd Comp	Math Cal	Math Rsn	Writing	BSI	Results	
Std 89	AU	72	54	83	77	42	66	83	80	LRE TRANSITION	
Std 90	DD	73	67			--LAP--			54	LRE TRANSITION	
Std 91	SLI	NA	80	85	72	104	76	NA	46	LRE TRANSITION	
Std 92	SLD	76	68	74	53	54	58	80	NA	LRE TRANSITION	
Std 93	ID	82	69	55	40	51	47	40	NA	LRE TRANSITION	
Std 94	MD	NA	NA	NA	NA	NA	NA	NA	NA	LRE TRANSITION	

## **4. Discussion**

### **4.1 Implications**

#### **4.1.1 Year One**

Of the 20 candidates identified by the Academic Mainstreaming Decision Tree, ten (10) Students successfully made the transition to a general education placement (50%) during the school year, and three (3) more were scheduled to make a similar transition relatively early in the next school year (15%); making for a total of 65% transition success based on the first year limited implementation of the Mainstreaming Process. These numbers supported an extension of this pilot transenvironmental programming implementation given we were able to use our mainstreaming tools to identify the potential candidates for mainstreaming early.

#### **4.1.2 Year Two**

Of the 53 candidates identified by the Academic Mainstreaming Decision Tree, 16 Students successfully made the transition to a general education placement (30%) during the school year, and five (5) more were scheduled to make a similar transition relatively early in the next school year (10%); making for a total of 40% transition success based on the second year implementation of the Mainstreaming Process. Three (3) of seven kindergarten students in Diagnostic Kindergartens were able to access the general education kindergarten as well.

These numbers supported an extension of this transenvironmental programming implementation district wide. When all self-contained classrooms were evaluated, an additional 26 students in SEL classrooms were identified as candidates for mainstreaming based on the Behavioral Mainstreaming Decision Tree. Of those, nine (9) were able to access the mainstream classroom 75-100% of the day and were able to successfully transition to a general education with part time special education placement. The other 17 were able to be in mainstreaming 25-50% of the time but lacked the SocioEmotional skills to obtain independence during the school year.

For the Life Skills/severe/ID cluster units, nine (9) students were identified as candidates for mainstreaming based on teacher report of CBM performance. All nine (9) (100%) of these students were able to access the mainstream curriculum and were able to transition to a general education with part time special education placement.

For diagnostic kindergarten students (academic self-contained kindergarten), seven (7) candidate students were identified. Of these seven, three (3) were able to access the mainstream kindergarten classroom >50% of the time and were transitioned to a general education classroom with part time special education. The other four (4) students had not yet developed the self-regulation skills to reliably spend >25% of their day in the mainstream setting.

Overall, 94 candidate students across all special education settings were identified as candidates, and 41 were able to successfully transition into a general

education with part time special education services placement for this coming year. In other words, 43% of identified candidate students were able to successfully transition from full time to part time special education.

An additional 10 were able to access a less restrictive unit class- room (*e.g.*, Severe to Mild/Moderate cluster unit or SEL/behavior unit to Mild/Moderate cluster unit). This meant that 54% of identified candidate students were able to access a less restrictive environment as defined by IDEIA.

#### **4.1.3 Computational Analysis**

Computationally, the methods provided in this manuscript demonstrate all the information needed for moving students into the appropriate LRE is available in the special education evaluation. That means all data qualified for special education have all the data needed to determine LRE available at the moment they qualify for special education services. The recursive partitioning algorithm was sufficient to sort students into reasonable groups that could easily be manually sorted into LRE groups using the Academic Mainstreaming Decision Tree. Intriguingly, the results of recursive partitioning with or without academic scores present resulted in highly similar sorting, there were just a greater number of categories when academic testing was included.

For hierarchal clustering, the algorithm reached highly similar conclusions as the regression trees from the recursive partitioning. There was a group of outliers that did not appear like students receiving special education that were labeled GenEd, and a group of mainstreaming and inclusion students. Both the clustering and partitioning methods were conservative in that they erred in sorting students in a slightly more restrictive environment than the one the student was eventually placed in.

Most importantly, when the validity of the system was formally assessed using a support vector machine algorithm with K-means cross validation, the computational methods were 85% accurate. This means 85% of the students were placed in the same LRE as when they were manually sorted. It would be preferable to have >90% correct sorting, but we view this computational sorting as a preliminary step that must be followed up by manual scrutiny.

Of additional interest but not formally assessed in this report was that the accuracy of classifying students increases with the addition of data into the classification matrix. When a check was done by importing the year 1 data into the year 2 matrix, there was more accurate classification of year 1 student. Future directions should include increasing the amount of data available to the classifier to perhaps increase predictive validity beyond the present 84-85%.

#### **4.1.4 Overall Implications**

Of particular interest was the fact that by enriching the candidate pool of students to those empirically predicted to show success in the general education classroom, the task of mainstreaming for teachers becomes much less overwhelming so far as the day to

day logistics are concerned. Of the 3 classes participating in the pipeline during the first year, one classroom had four (4) of their 15 students (27%) in mainstreaming for some portion of the day. Another class had six (6) of 20 students (30%) in the mainstream classroom for the entire day. The third had three (3) of 12 students (25%) in the mainstream classroom for a significant portion of the day. One implication of these numbers was that the special education teachers had a significantly lightened load so far as teaching requirements. This reduced teaching load provided opportunities to work more directly with the remaining students in the classroom without having to accommodate for the instructional needs of a group of students performing at a higher academic level than the rest of the classroom. When this was extended to include the second year, a similar 25-30% of students mainstreaming was accomplished. Across the 8 classrooms, there were 102 total students, of whom 53 were identified as potential mainstreaming candidates (51%). A total of 29 students participated in full day mainstreaming (28%), with an additional 15 accessing mainstream curriculum for either language arts or math (for a total of 42%).

Not emphasized earlier this manuscript was one additional utility of the Academic Mainstreaming Decision Tree and Behavioral Mainstreaming Decision Tree for identifying social inclusion placement as well as mainstreaming placement for single subjects. Beyond the students that transitioned, an additional six (6) students received access to ELA or mathematics instruction based on placement decisions motivated by the Academic Mainstreaming Decision Tree. Full mainstreaming was not pursued with these students based on profound achievement gaps for the other subject compared to general education peer groups.

#### **4.2 Limitations**

One limitation of this pilot implementation was the relatively low number of candidate students identified by the Academic Mainstreaming Decision Tree during year 1. This pilot implementation of the Mainstreaming Process was only slated for two classrooms and a third came on board mid-way through the year. As such, only 20 students were identified as candidates for transition from a self-contained special education placement into a general education placement. However, these 20 students were from a total special education population of 62 students (32%) in self-contained academics classrooms, the data appear to show some predictive value. However, when we moved to a district-wide implementation we were able to identify a greater number of candidate students, a lower percentage were able to be successful in a mainstreaming environment we interpret this as the pilot implementation being carried out at schools with an already recognized need for a transenvironmental programming pipeline, so it served as an enriched sample. When the model was extended, the data reflected a more realistic situation wherein 28% rather than 50% of candidate students were able to access educational placements in general education classrooms.

Additionally, as can be seen from Table 4 and Table 5 there were missing

Academic Achievement data that made identifying candidate students difficult. The best way to remedy this deficiency moving forward will be to verify special education files have all the data necessary for the Academic Mainstreaming Decision Tree at the beginning of the year and collecting any "missing" assessments early in the year, during the first quarter.

Finally, there was always difficulty in identifying personnel to assist with inclusion and mainstreaming. If students need more restrictive environments as an initial mainstreaming option, then there will likely be a personnel requirement. Methods and supports remain to be developed to mitigate the effect of a lack of personnel. With the presently reported implementation, preferential focus was placed on transitioning students that had the lowest need of support personnel. The other students had to be put into small groups for mainstreaming or inclusion, and this de-individualized the process somewhat, resulting in less than optimal mainstreaming outcomes.

### **4.3 Next Steps**

Subsequent analyses are necessary with larger datasets to determine if the computational methods underlying the Academic Mainstreaming Decision Tree could be automated and centralized in an on-line, cloud based repository. The long term utility of such an on-line system this would be a quick screen for LRE that administrators and IEP teams could use to guide placement decisions once the IEP goals are outlined. Such a system would also facilitate data-based decision making by rural LEA that lack sufficient data to develop computational analyses to predict student success. Giving them access to a broad, diverse data set may help the teams in designing instructional programs for individual students.

Development of such a database would require access to special education data that crosses socioeconomic, gender, and racial divides to guarantee the system is maximally unbiased. Implementation would also require a system capable of protecting identifiable information from any uploaded data to prevent inadvertent FERPA or HIPAA violations. However, these would be possible with a RedCap, MySQL or SAS-based database with a Java-based front-end to query the database for comparison data and any actual computations could be carried out either in a cloud-based system or on a local computer.

### **4.4 Conclusions**

Overall, the Academic Mainstreaming Decision Tree, Behavioral Mainstreaming Decision Tree and associated Mainstreaming Process proved to be useful transenvironmental programming tools for the self-contained special education classrooms they were tested in. These methods were reasonably simple and straightforward to administer. We feel that these specific processes may prove useful for facilitating the transition of students in self-contained special education placements

into the general education population. Our implementation resulted in an overall transition success of 50% of identified candidate students the first year and 43% for the second year.

An additional benefit of the Academic Mainstreaming Decision Tree was that it was inherently conservative with regards to student behavior and coping skills. This was accomplished by using raw evaluation data paired with unbiased computational analyses to generate decision making methods. By taking Adaptive Function as the primary consideration, students that have difficulty in coping with novel situations were started in more restrictive mainstreaming environments than those that showed higher adaptive composite scores. Upon demonstrating success in these more restrictive environments, the supports were faded and the student moved to increasingly less restrictive environments. In a similar vein, the final step of the Academic Mainstreaming Decision Tree was to account for elevated behavioral problems or heightened anxiety that may interfere with academic and/or behavioral success in the general education classroom by explicitly adding scaffolds and supports into placement decisions.

Based upon the current results, the pilot implementation of the Mainstreaming Process was successful in that between 40-50% of the identified candidate students were able to make a transition from a highly restrictive classroom placement (self-contained special education classes) to a much less restrictive placement, namely general education with part time special education services. This means that these students went from receiving 6.5 hours (390 minutes) of daily special education services to receiving between 30-90 minutes of special education services daily. An additional 10% were able to access a less restrictive self-contained unit placement.

The implications of this pipeline are clear. For the cascading system of special education service provision to work, efforts need to be made to challenge students and offer the opportunity for students to move toward less restrictive placements. This Academic Mainstreaming Decision Tree, Behavioral Mainstreaming Decision Tree, and Mainstreaming Process are two tools that may facilitate such a transition.

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Michael Ryan Hunsaker  
DEVELOPMENT, VALIDATION, AND IMPLEMENTATION OF  
A MAINSTREAMING PROCESS TO TRANSITION STUDENTS FROM SELF-CONTAINED  
SPECIAL EDUCATION INTO GENERAL EDUCATION PLACEMENTS

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**Specific Learning Disability Eligibility Combination Method**

**What is the Problem?**

**Target Academic Area:** \_\_\_\_\_

**Date of IEP Team Meeting:** \_\_\_\_\_

**Student Name:** \_\_\_\_\_

**DOB:** \_\_\_\_\_

**Grade:** \_\_\_\_\_

**Why is it Happening?**

<b>Impact on Learning</b>	<b>Minimal</b>	<b>Mild</b>	<b>Moderate</b>	<b>Severe</b>
1) Summary of Discrepancy Information: (FSIQ v. Achievement)	The difference between the student's expected achievement score and obtained achievement score represents no discrepancy to a mild discrepancy <input type="checkbox"/>		The difference between the student's expected achievement score and obtained achievement score represents moderate discrepancy to a severe discrepancy <input type="checkbox"/>	
2) Pattern of Cognitive Strengths and Weaknesses (FSIQ or PRI) Test: _____ Date: _____	Evenly developed index scores; no significant weaknesses <input type="checkbox"/>		Scatter of index scores; one or more significant weaknesses <input type="checkbox"/>	
3) Achievement Standardized Test Scores (WJIII-NU, WJIV): Test: _____ Date: _____	SS = 90 or above Average <input type="checkbox"/>	SS = 80 - 89 Low Average <input type="checkbox"/>	SS = 70 - 79 Low <input type="checkbox"/>	SS = 69 or below Very Low <input type="checkbox"/>
4) Relative Proficiency Index: (WJIII-NU, WJIV)	68/90 and above Limited to Average <input type="checkbox"/>	34/90 to 67/90 Limited <input type="checkbox"/>	19/90 to 33/90 Very Limited to Limited <input type="checkbox"/>	0/90 to 18/90 Negligible to Very Limited <input type="checkbox"/>
5) SAGE Data (most current): Yearly Summative Assessment	Highly Proficient (4) <input type="checkbox"/>	Proficient (3) <input type="checkbox"/>	Approaching Proficient (2) <input type="checkbox"/>	Below Proficient (1) <input type="checkbox"/>

**Progress Monitoring Data: Student performance data used to identify or measure progress towards instructional and grade level goals. Attach most recent data and graphs from benchmark and progress monitoring data.**

6) Benchmark Data (performance level)	At or above grade level benchmark <input type="checkbox"/>	Approaching grade level benchmark <input type="checkbox"/>	Below grade level benchmark <input type="checkbox"/>	Well below grade level benchmark <input type="checkbox"/>
7) Benchmark/Screenner Data: General Ed Peer Comparison	0-24% of peers are at or above grade level benchmark <input type="checkbox"/>	25-49% of peers are at or above grade level benchmark <input type="checkbox"/>	50-74% of peers are at or above grade level benchmark <input type="checkbox"/>	75-100% of peers are at or above grade level benchmark <input type="checkbox"/>
8) Progress Monitoring Data (rate of progress): Review of progress monitoring data (Over 4-6 week period)	Rate of growth demonstrates adequate trend towards grade level benchmark <input type="checkbox"/>	Rate of growth demonstrates somewhat adequate trend towards grade level benchmark. <input type="checkbox"/>	Rate of growth demonstrates inadequate trend towards grade level benchmark <input type="checkbox"/>	Rate of growth shows no growth towards grade level benchmark <input type="checkbox"/>
9) Intervention Tier required to attain rate of progress above: In what Tier and for what amount of supplemental time has student received intervention?	<b>Tier 1-General Ed/Whole or Small Group</b> <input type="checkbox"/> Core Instruction Only	<b>Tier 1 PLUS Tier 2</b> (additional 30 min sessions multiple times per week of homogeneous small group in target academic area) <input type="checkbox"/>	<b>Tier 1 PLUS Tier 3</b> (additional 45 min sessions, multiple times per week of homogeneous small group in target academic area) <input type="checkbox"/>	<b>Tier 1 PLUS Tier 4</b> (additional 90+ min sessions, multiple times per week of homogeneous small group in target academic area) <input type="checkbox"/>
	Provided by: _____	Provided by: _____	Provided by: _____	Provided by: _____

**What Should Be Done?**

**At least 7 of 9 check marks appear in the "Moderate" or "Severe" columns:**

YES  NO

**AND at least 5 of the above 7 check marks appear in the "Severe" column:**

YES  NO

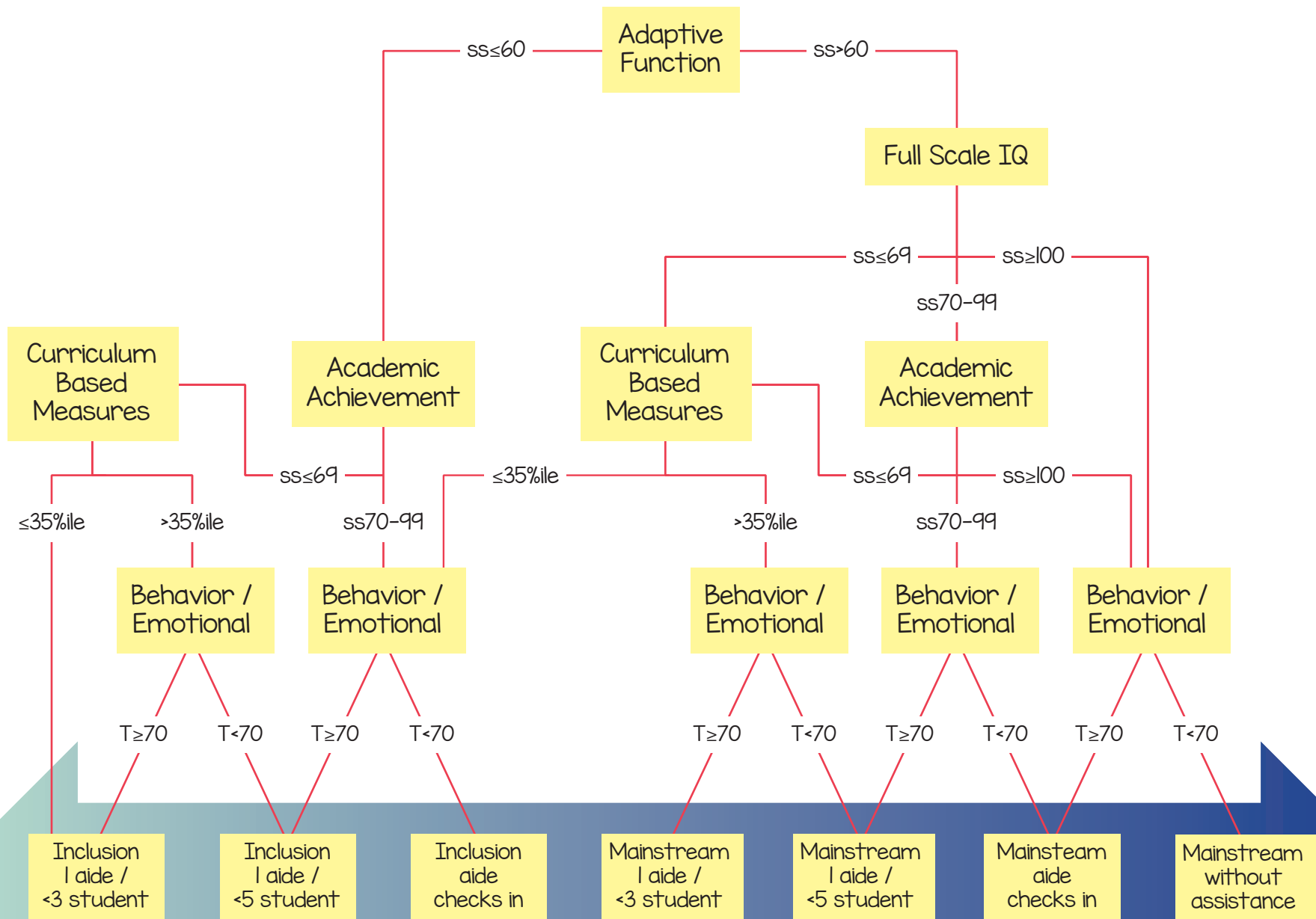
**Eligibility Team has ruled out "considerations" as substantially impacting the student's educational performance:**

YES  NO

**Eligibility Team has determined that the student has a Specific Learning Disability in this area:**

YES  NO

# Inclusion / Mainstream Initial Placement Decision Tree

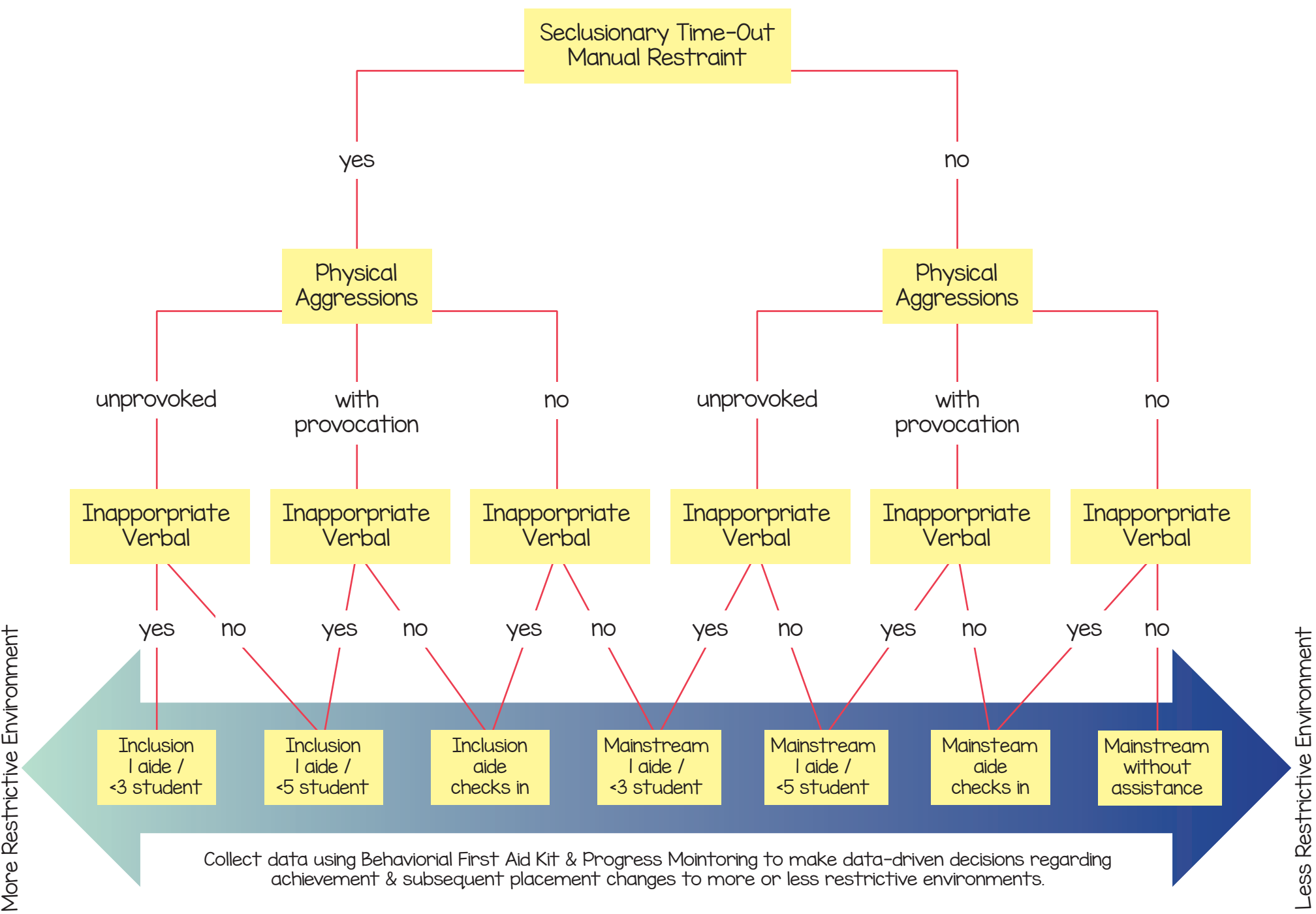


Collect data using Behavioral First Aid Kit & Progress Monitoring to make data-driven decisions regarding achievement & subsequent placement changes to more or less restrictive environments.

More Restrictive Environment

Less Restrictive Environment

# Behavior Mainstreaming Progress Decision Tree



## Special Education Mainstreaming Plan

Name: \_\_\_\_\_ Grade: \_\_\_\_\_ Teacher: \_\_\_\_\_  
 School: \_\_\_\_\_ Classification \_\_\_\_\_ Date of Review: \_\_\_\_\_

Formal Assessments		Informal Assessments	
Cognitive		Reading	
Achievement		Writing	
Adaptive		Math	
Communication		Behavior	
Behavior		Related Services	
Other		Other	

Mainstreaming Expectations	Developing	Expanding	Independent	Needed Instruction/Support
<b>Follows Classroom Routines and Rules</b>				
1. Complies with directions				
2. Follows classroom routines				
3. Handles transitions and accepts change to rules, routines and/or procedures				
<b>Academic Learning</b>				
1. Actively participates in learning tasks				
2. Volunteers answers (raise hand and wait to be called on)				
3. Completes assignments				
4. Reads orally				
5. Asks for help				
6. Participates in partner or group work				
<b>Social Emotional Learning</b>				
1. Communicates and interacts with peers				
2. Ability to respond to frustration(s)				
3. Ability to problem solve				
4. Stays in seat or assigned area				
<b>Organizational Skills</b>				
1. Able to utilize a planner or calendar to track assignment				
2. Utilizes and manages necessary materials (notebook, binder, pencil pouch, etc.)				
3. Completes and turns in assignments (in class and/or homework)				
4. Written work legible and neat				

Note: Provide the minimum supports necessary for success then gradually fade to increase independence.



## Special Education Mainstreaming Plan

### Mainstreaming Plan

Start Date	Subject	Teacher/Classroom	Time

### Notes

### Monitoring

Who will be responsible for monitoring progress: \_\_\_\_\_

How frequently will monitoring take place? Daily \_\_\_\_\_ Weekly \_\_\_\_\_ Bimonthly \_\_\_\_\_ Monthly \_\_\_\_\_

How implementation and outcomes be evaluated?

Teacher Monitoring:

Student Monitoring:

### Signature of Team Members:

_____	_____
_____	_____
_____	_____
_____	_____

**Mainstream Review** - Mainstreaming data review and changes to mainstreaming schedule.

Date: \_\_\_\_\_

# Classroom Ecological Inventory

General Education Teacher \_\_\_\_\_

Special Education Teacher \_\_\_\_\_

Principal \_\_\_\_\_

School \_\_\_\_\_

---

Answer the following questions to best describe your classroom and teaching practices

Grade/s Taught (mark all that apply)

- |                                    |                                    |
|------------------------------------|------------------------------------|
| <input type="checkbox"/> 1st grade | <input type="checkbox"/> 4th grade |
| <input type="checkbox"/> 2nd grade | <input type="checkbox"/> 5th grade |
| <input type="checkbox"/> 3rd grade | <input type="checkbox"/> 6th grade |

I am a \_\_\_\_\_ teacher

- |                                   |   |
|-----------------------------------|---|
| <input type="checkbox"/> Core     | <input type="checkbox"/> Self Contained |
| <input type="checkbox"/> Elective | <input type="checkbox"/> PE             |
| <input type="checkbox"/> Resource | <input type="checkbox"/> Other          |

At minimum I expect students to be at a \_\_\_\_\_ grade reading level

- |   |   |
|---|---|
| <input type="checkbox"/> Pre-Kindergarten | <input type="checkbox"/> 3rd-4th        |
| <input type="checkbox"/> Kindergarten     | <input type="checkbox"/> 5th-6th        |
| <input type="checkbox"/> 1st-2nd          | <input type="checkbox"/> No expectation |

At minimum I expect students to be at a \_\_\_\_\_ grade writing level

- |   |   |
|---|---|
| <input type="checkbox"/> Pre-Kindergarten | <input type="checkbox"/> 3rd-4th        |
| <input type="checkbox"/> Kindergarten     | <input type="checkbox"/> 5th-6th        |
| <input type="checkbox"/> 1st-2nd          | <input type="checkbox"/> No expectation |

Answer the following questions to best describe your classroom and teaching practices

At minimum I expect students to be at a \_\_\_\_\_ grade math level

- |   |   |
|---|---|
| <input type="checkbox"/> Pre-Kindergarten | <input type="checkbox"/> 3rd-4th        |
| <input type="checkbox"/> Kindergarten     | <input type="checkbox"/> 5th-6th        |
| <input type="checkbox"/> 1st-2nd          | <input type="checkbox"/> No expectation |

At minimum I expect students to bring assigned materials \_\_\_\_\_% of the time

- |                                 |   |
|---------------------------------|---|
| <input type="checkbox"/> 0-9%   | <input type="checkbox"/> 50-74%         |
| <input type="checkbox"/> 9-24%  | <input type="checkbox"/> 75-100%        |
| <input type="checkbox"/> 25-49% | <input type="checkbox"/> No expectation |

At minimum I expect students to stay in their seat \_\_\_\_\_% of the time

- |                                 |   |
|---------------------------------|---|
| <input type="checkbox"/> 0-9%   | <input type="checkbox"/> 50-74%         |
| <input type="checkbox"/> 9-24%  | <input type="checkbox"/> 75-100%        |
| <input type="checkbox"/> 25-49% | <input type="checkbox"/> No expectation |

At minimum I expect students to stay quiet \_\_\_\_\_ % of the time

- |                                 |   |
|---------------------------------|---|
| <input type="checkbox"/> 0-9%   | <input type="checkbox"/> 50-74%         |
| <input type="checkbox"/> 9-24%  | <input type="checkbox"/> 75-100%        |
| <input type="checkbox"/> 25-49% | <input type="checkbox"/> No expectation |

At minimum I expect students to work w/o teacher attention \_\_\_\_\_ % of the time

- |                                 |   |
|---------------------------------|---|
| <input type="checkbox"/> 0-9%   | <input type="checkbox"/> 50-74%         |
| <input type="checkbox"/> 9-24%  | <input type="checkbox"/> 75-100%        |
| <input type="checkbox"/> 25-49% | <input type="checkbox"/> No expectation |

Answer the following questions to best describe your classroom and teaching practices

Most worksheets in my class are:

- |  |                                      |
|--|--------------------------------------|
| <input type="checkbox"/> Fill In the Blank | <input type="checkbox"/> Long Answer |
| <input type="checkbox"/> Multiple Choice   | <input type="checkbox"/> Essay       |
| <input type="checkbox"/> Short Answer      | <input type="checkbox"/> Show Work   |

Most quizzes in my class are:

- |  |                                      |
|--|--------------------------------------|
| <input type="checkbox"/> Fill In the Blank | <input type="checkbox"/> Long Answer |
| <input type="checkbox"/> Multiple Choice   | <input type="checkbox"/> Essay       |
| <input type="checkbox"/> Short Answer      | <input type="checkbox"/> Show Work   |

Most tests in my class are:

- |  |                                      |
|--|--------------------------------------|
| <input type="checkbox"/> Fill In the Blank | <input type="checkbox"/> Long Answer |
| <input type="checkbox"/> Multiple Choice   | <input type="checkbox"/> Essay       |
| <input type="checkbox"/> Short Answer      | <input type="checkbox"/> Show Work   |

Homework, worksheets, and assignments are accepted:

- |  |  |
|--|--|
| <input type="checkbox"/> Not accepted late | <input type="checkbox"/> Within the term   |
| <input type="checkbox"/> Within 1 week     | <input type="checkbox"/> Until end of year |
| <input type="checkbox"/> Within 2 weeks    | <input type="checkbox"/> No expectation    |

Quizzes and Tests are accepted:

- |  |  |
|--|--|
| <input type="checkbox"/> Not accepted late | <input type="checkbox"/> Within the term   |
| <input type="checkbox"/> Within 1 week     | <input type="checkbox"/> Until end of year |
| <input type="checkbox"/> Within 2 weeks    | <input type="checkbox"/> No expectation    |

Answer the following questions to best describe your classroom and teaching practices

I collect Homework by:

- |  |  |
|--|--|
| <input type="checkbox"/> Calling for it during class | <input type="checkbox"/> No prompts            |
| <input type="checkbox"/> Collect from students       | <input type="checkbox"/> Back and forth folder |
| <input type="checkbox"/> Remind student to turn in   | <input type="checkbox"/> No expectation        |

I collect quizzes by:

- |  |  |
|--|--|
| <input type="checkbox"/> Calling for it during class | <input type="checkbox"/> No prompts            |
| <input type="checkbox"/> Collect from students       | <input type="checkbox"/> Back and forth folder |
| <input type="checkbox"/> Remind student to turn in   | <input type="checkbox"/> No expectation        |

I collect tests by:

- |  |  |
|--|--|
| <input type="checkbox"/> Calling for it during class | <input type="checkbox"/> No prompts            |
| <input type="checkbox"/> Collect from students       | <input type="checkbox"/> Back and forth folder |
| <input type="checkbox"/> Remind student to turn in   | <input type="checkbox"/> No expectation        |

I collect in class worksheets by:

- |  |  |
|--|--|
| <input type="checkbox"/> Calling for it during class | <input type="checkbox"/> No prompts            |
| <input type="checkbox"/> Collect from students       | <input type="checkbox"/> Back and forth folder |
| <input type="checkbox"/> Remind student to turn in   | <input type="checkbox"/> No expectation        |

Students are requires to take notes from lecture by:

- |  |  |
|--|--|
| <input type="checkbox"/> Free hand       | <input type="checkbox"/> Graphic Organizer |
| <input type="checkbox"/> Copy from board | <input type="checkbox"/> Notes provided    |
| <input type="checkbox"/> Fill in blanks  | <input type="checkbox"/> No expectation    |

Answer the following questions to best describe your classroom and teaching practices

Students are required to take notes from movies by:

- Free hand
- Copy from board
- Fill in blanks
- Graphic Organizer
- Notes provided
- No expectation

Chromebooks or iPads are used in my classroom \_\_\_\_\_ % of the time

- 0-9%
- 9-24%
- 25-49%
- 50-74%
- 75-100%
- No expectation

If you feel an important skill or expectation concerning transition was not addressed, please comment here:

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For office use only:	
Date of completion	_____
Data input	_____
Reconciliation meeting date	_____
Next Steps	_____